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Revenue Train Load and Large Cars.*

[The full title of this paper, as presented before the New York Railroad Club, was "Increasing the Revenue Train Load by the Use of Large Capacity Cars and Improvements in Construction and Maintenance of Details."]

The recent designs and improvements in rolling stock have resulted in the attainment of such a position, that any future improvements for the increasing of revenue load are to be sought for in close attention to details rather than radical changes in designs. It is not the object of this paper to propose new devices, but to review some of the causes of train resistance. By calling attention to them, the importance of their sum will be more apparent, and a thorough discussion may result in bringing out ways of ameliorating them. At least it may cause us to be on the lookout for remedies, where possibly some of the items have been so small as to escape attention or seem unworthy of further effort.

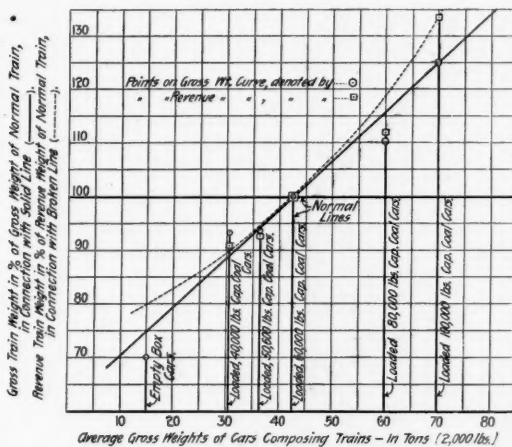
One of the largest economies that have been recently introduced is the concentration of trainload on a short total wheel base by the use of large capacity cars. While this is generally known and understood, it is not so universal that an analysis of the causes, and results attained, will not be of interest.

A train of cars being hauled through a curve is somewhat analogous to checking the pull on a rope by taking a turn around a post and pulling on the free end. The resistance necessary to be overcome in hauling the rear of the train is similar to the pull on the free end of the rope, the curve (together with this pull) furnishes the restraining force in the form of flange friction. It is also probable that the rolling friction between rail and wheel is not altogether in proportion to the weight on the wheel, so that for two trains of equal weight on a straight and level track that which has the fewer number of wheels will offer the less resistance. From data of various tests on a number of roads I find that a train of average empty cars (each car averaging about 15 tons light weight) requires 30 per cent. more power for the same tonnage, or the same engine can only handle 70 per cent. of the weight of an average loaded train composed of 60,000-lb. capacity cars. This would probably hold true on account of the foregoing reasons, if a train were composed of loaded cars weighing (with contents) about 15 tons, it being a question of length of total wheel base of train, independent of the ratio of lading to total weight, but directly proportional to the gross weights of cars.

The blue prints [see diagram and two tables.—Ed.] which have been distributed, give the data of a series of tests. The trains were hauled by the same engine, and over the same divisions. From the actual test data, Table I, you will note that trains 1, 2 and 3 used about the same amount of coal per trip, while trains 4 and 5 varied somewhat. If we call the coal per trip, used with trains 1, 2 and 3, 100 per cent., and deduct from trains 4 and 5 the percentage of train weight indicated by extra coal consumption, all trains may then be considered as having the same resistance, and the total weights and revenue loads are then comparable. The revised figures are shown in Table II. This is also

*A paper by Mr. F. F. Gaines, Mechanical Engineer, Lehigh Valley Railroad; read at the May meeting of the New York Railroad Club.

shown graphically by the heavy line on the chart. The horizontal ordinates are the average gross weights of the cars in each train, and the vertical ordinates the percentage the gross weights of each train are of the gross weight of the train composed of 60,000-lb. capacity cars. The latter train has been considered the average or normal in all comparisons. As the base of most tonnage rating systems is the loaded car of 60,000 lbs. capacity the chart indicates the percentage of addition to, or reduction from, the standard rating, when cars are empty, partly loaded, or of varying capacities. In the same manner the broken line shows the percentage the revenue load in the various trains is of the revenue load in the 60,000 lbs. capacity car train. Due to the decreased total wheel base, and the decreased ratio of light weight to total weight, the revenue load in the large capacity cars



increases very rapidly. Considering the revenue load in the normal train as 100 per cent. that in the train of 40,000 lbs. capacity cars is 90.76 per cent.; in the train of 50,000 lbs. capacity cars is 92.82 per cent.; that in the train of 80,000 lbs. capacity cars is 111.95 per cent.; and that in the train of 100,000 lbs. capacity cars is 133.7 per cent. Is not the gain of revenue load from this source sufficient to warrant the retirement of light capacity cars, say 20 tons and under?

The tests and chart only apply to cars for handling heavy raw material in bulk, such as ore, coal, and pig iron, and modifications due to heavy grades have been neglected. When we come to the box car, where the lading may be anything from straw hats to pig lead, the proper size and capacity of car is still an unsettled question. Except in isolated cases, where there is a special line of business which affords a normal full load, and where circumstances permit of keeping heavy capacity cars for this trade in their home territory, can the revenue load be increased by exceeding a box car of 80,000 lbs. or

bers themselves, in some designs, being changed from merchant bars to structural and pressed steel sections. As a result we now have trucks of the archbar type strong enough to always retain the parallelism of axles, and yet flexible enough to readily accommodate themselves to varying conditions of track. Is it not possible to have too much rigidity; and is not the well designed, modern archbar truck at least as desirable as the more rigid, solid-side type?

Lubrication is a matter that too often receives less attention than the best results warrant. So long as friction does not show itself openly in the form of a hot box it is assumed that further improvement is visionary, or at the best will not result in economy. As soon as the number of hot boxes has been reduced an apparent chance for economy, by reducing the number of car inspectors, exists. Is it advisable to take advantage of it? As an instance that considerable friction may be present without manifesting itself in a hot box, in hard winter weather when the oil has been congealed by the cold the friction is so great that it is sometimes impossible to start a train that has stood for any length of time. From laboratory tests it is known that a certain amount of friction can be taken care of by radiation without reaching a temperature which causes ignition of the lubricant.

The exclusion of all foreign substances from the journal boxes, such as dirt, dust, sand, water, etc. is very closely allied to lubrication. There are in existence many forms of dust guards, which serve their purposes with a greater or less degree of perfection. A piece of wood with a hole in it (which is probably more largely used than any other form on freight equipment) is about at the bottom of the list.

Does the M. C. B. pressed steel lid fill its function? If so, is its function that of a screen to prevent coarse articles entering? In its most perfect form is it not far from dust proof? There are patented devices which are much better, but like all good things you have to pay for them. By more systematic attention to the lubrication of all cars, and the use of dust proof guards and lids, could not considerable friction be eliminated? And if one, two or more cars could be added to a train as a result, would not the increase in revenue load more than offset the increased cost?

Whether it is advisable to use truck and body bolsters strong enough to carry the load and be center bearing, or to depend on some form of frictionless side bearing, if there is such a thing, is an open question. That there is warrant for one device or the other needs no proof. I have seen cars with weak bolsters and the average side bearing which, when run through a lead on a siding, would refuse to run on a fair grade with a good start. I have the data of two tests made on different roads, to determine the amount of resistance, due to this factor, in trial trains over a division. In one test it required 8.5 per cent. more power and the engine consumed 2½ tons more coal in hauling the non-center bearing train of equal weight. In the other test, the same engine being

TABLE I.—ACTUAL RESULTS OF TESTS.

Test train number.	No. of loaded cars in train.	Normal capacity.	Weight of one car and contents (average).	Total weight of all cars and contents (gross w't.).	Light weight of all cars (tare weight).	Revenue load.	Coal burned on trip.	Coal burned per trip in per cent.	Total train length excluding engine and caboose.	Gross weight % (gross w't. of Train No. 3 = 100%).	Revenue weight % (revenue weight of Train No. 3 = 100%).
		Tons.	Tons.	Tons.	Tons.	Tons.	Lbs.	P. c.	Feet.	P. c.	P. c.
1.....	36	50	70	2,500	676	1,824	18,264	100.	1,209	125.	133.70
2.....	37	40	60	2,207	680	1,527	18,457	100.	1,249	110.35	111.95
3.....	47	30	42.5	2,000	636	1,364	18,242	100.	1,540	100.	100.
4.....	55	25	36.4	2,003	649	1,354	19,511	106.5	1,632	100.15	99.27
5.....	66	20	30.5	2,012	676	1,338	19,659	107.3	1,968	100.6	97.95

TABLE II.—VIRTUAL RESULTS ON BASIS OF EQUAL COAL CONSUMPTION.

1.....	36	50	70	2,500	676	1,824	18,264	100.	1,209	125.	133.70
2.....	37	40	60	2,207	680	1,527	18,457	100.	1,249	110.35	111.95
3.....	47	30	42.5	2,000	636	1,364	18,242	100.	1,540	100.	100.
4.....	52	25	36.4	1,873	607	1,266	18,321	100.	1,543	93.65	92.82
5.....	61	20	30.5	1,865	627	1,238	18,321	100.	1,810	93.25	90.76

even 60,000 lbs. capacity, for general use? Before leaving this part of the subject it is to be noted that there is an additional economy in the use of large capacity cars normally loaded, due to minimum track room occupied in sidings and yards, and the smaller number of units to be handled in making up and dispersing trains.

Taking up some of the lesser items that have an influence on attaining the desired result, truck design is undoubtedly an important factor. The old archbar truck had much the same bringing up as Topsy—just grew. With flexible members that were rarely or never strong enough, and roughly put together, it was more accident than good design if the axes of the axles were parallel. When the axes were out of line we had as a result increase of wheel and journal friction and decrease of revenue load. The pressed or structural steel truck, with solid side frame, absolutely rigid as regards the parallelism of the axles, and squareness of frame, was a decided step in advance. Contemporaneously with the growing use of the solid-side truck, rational methods of design were applied to the archbar type, and the members were made strong and rigid enough to prevent distortion; the mem-

used for both trains, the coal consumption was 22.5 per cent. less for the center bearing train. As both trains were handled by the same engine and crew, the total weight of train being the same, it requires 22.5 per cent. more power to handle the non-center bearing train. For the same amount of power the engine could have hauled 22.5 per cent. greater tonnage, if the cars had been center bearing, and as the proportion of net weight was 68.2 per cent. of the gross weight the revenue load would have been increased 15.4 per cent. Frictionless side bearings may accomplish the same results, but it is yet to be demonstrated. While the stiffer bolsters required for center bearing cars may be more expensive on account of first cost, would not this be more than offset by the necessary attention and care to properly maintain any form of frictionless side bearing? Is the increased load due to the use of free swiveling trucks sufficiently large to pay for putting in new body and truck bolsters, or frictionless side bearings on cars that are not so equipped?

Another item which, while small, is not insignificant is the center plate friction. Our car capacities have increased from 40,000 lbs. to 100,000 lbs. Has the bearing

area been increased in proportion? The value of systematic lubrication of center plates is beginning to receive attention. Experiment shows that it is warranted. Mr. Squire, in a paper before the April meeting of the Western Railway Club, proved its value by the results of a series of tests. His conclusions are, that the lubrication of center plates, if only when applied, greatly reduces flange friction, and consequently increases the revenue load.

The form of the center plate itself is an important factor in the maintenance of lubrication. If the bearing surface is on a level with the kingpin hole, with no provision for the retention of the lubricant, only a heavy grease that will not run, is of any value, while a form that allows of the bearing surface being lower than the pin opening, will form a reservoir for the oil, and only requires an additional supply at long intervals. It would also seem reasonable that there is a choice of the material to be used. Is malleable iron, cast iron, or pressed steel the best adapted for good contact and reduction of friction? And in view of the fact that the unlubricated center plate causes considerable rail friction, is the cost of providing permanent lubrication justifiable?

The proper adjustment of brake beams frequently receives less attention than it deserves. The scrap heap will reveal the fact that a great many shoes are removed on account of one end being worn down completely, with little or no wear on the other end. This can be almost wholly attributed to the manner in which the brake-beams are hung—allowing one end of the shoe to drag on the wheel. Stand by the track as a train passes, and you will hear the shoes rubbing on the wheels with surprising frequency, especially if the cars in the train are someone else's cars and not our own. Considering the small cost necessary to eliminate this source of friction, is it not worth more attention? The mismatching of wheels also causes friction. This requires only a minimum expense to remedy, and is largely a thing of the past.

In conclusion, is it not safe to say that, "by taking heed to ourselves" we can increase our revenue trainload in several ways? And how far is the first cost of refinements that contribute to this end justifiable?

Heavy Ten-Wheel Passenger Locomotives of the Cleveland, Cincinnati, Chicago & St. Louis Railway.

The Cleveland, Cincinnati, Chicago & St. Louis has recently received from the Baldwin Locomotive Works six heavy 10-wheel passenger locomotives that are doing some remarkably fine work. Two of these engines are Vaucain compounds and four are simple engines. The simple engines are shown by the accompanying engravings and are referred to in the specifications.

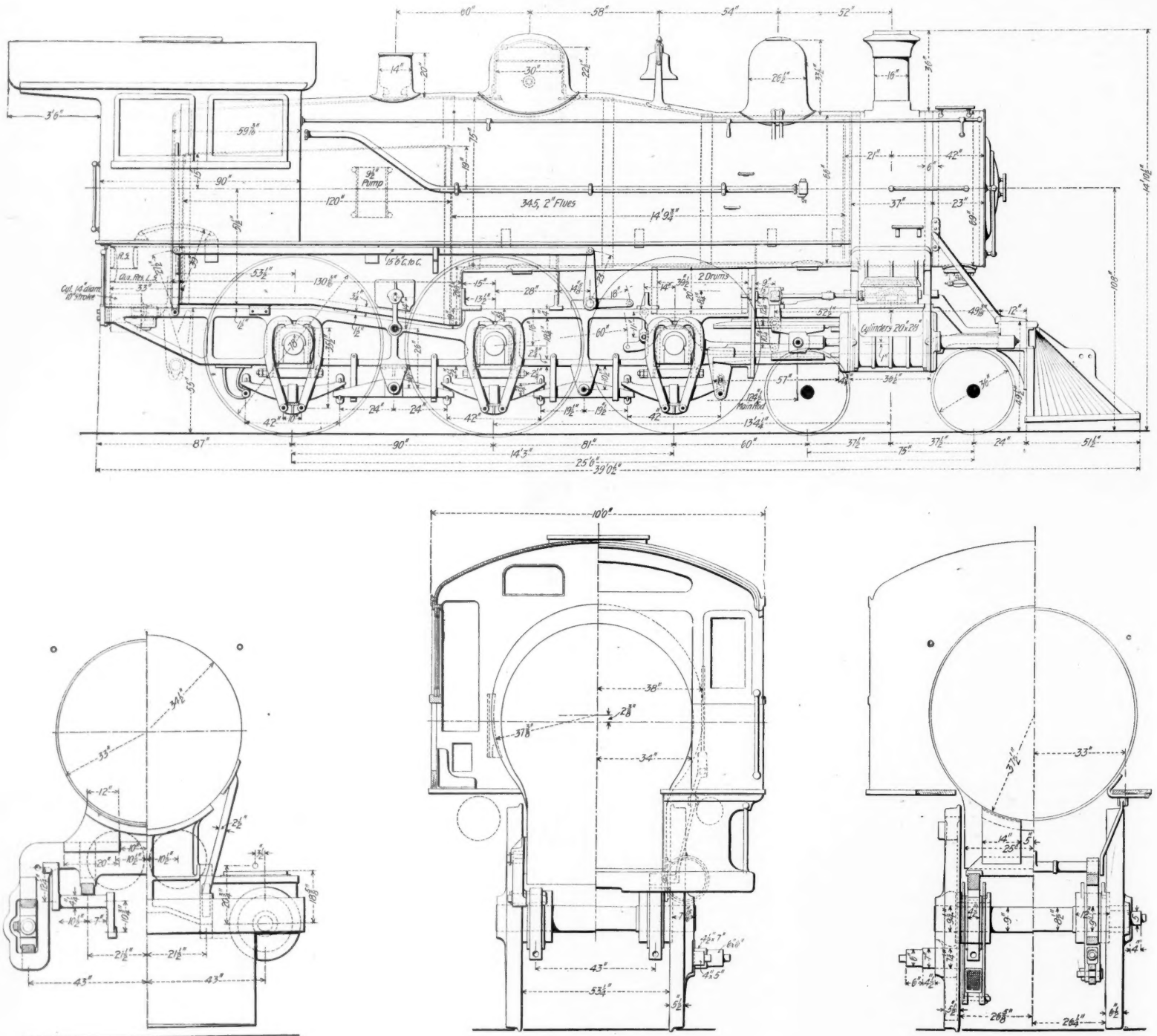
These engines are running between Cleveland and Indianapolis, hauling trains Nos. 11 and 19 westbound and Nos. 16 and 18 eastbound. The distance is 283 miles. Two of these trains are scheduled to make the run in 7 hours and 10 minutes. This is an average schedule speed of 40 miles an hour without deducting time for stops, 10 of which stops are shown on the time card. The other two runs call for an average schedule speed of 36 miles an hour and four or five more stops are scheduled. These trains out of Cleveland have 12 or 14 cars as far as Galion, Ohio, 80 miles west, and these engines have made the run between Cleveland and Galion, with 14 cars, making two stops, in two hours. Such a train of 14 cars weighs 600 tons. When a pure coal is furnished no trouble is experienced in making continuous runs of 283 miles between these points, and this is the regular practice. When the coal is of inferior quality, engines are changed at Bellefontaine, Ohio, about half way over the road. The average monthly mileage made by these engines is between 7,000 and 8,000 miles.

The simple engine shown has 134,000 lbs. on the driving wheels, a total weight of 174,200 lbs., cylinders 20 x 28

in., driving wheels 78 in. in diam. and a working steam pressure of 200 lbs. The boiler is of the extended wagon top type with 2,858 sq. ft. of heating surface, of which 200 sq. ft. are in the fire-box and 2,658 sq. ft. are in the tubes; the grate area is 34.27 sq. ft. The tubes are 2 in. in diam. and 14 ft. 9 3/4 in. long. The fire-box is above the frames and 10 ft. long and 41 1/2 in. wide. Allen-Richardson valves are used. The tender loaded weighs 120,000 lbs. and has a capacity for 6,000 gals. of water and 10 tons of coal.

The special equipment includes: Standard tires, Nathan injectors and lubricators, Kunkle safety valves, Coale mufflers, Gold steam heating apparatus, Leach sanding devices, American driver brakes, Westinghouse tender brakes, National-Hollow brake-beams, Ross-Mehan driver brake-shoes, Star steam gages and Jerome piston and valve rod packings. Other dimensions of the simple engines are as follows:

Wheelbase, total, of engine	25 ft. 6 in.
Wheelbase, driving	14 ft. 3 in.
Wheelbase, total (engine and tender)	54 ft. 11 1/4 in.
Length over all, engine	39 ft. 0 1/2 in.
Length, total, engine and tender	66 ft. 3 in.
Height, center of boiler above rails	9 ft.
Height of stack	14 ft. 10 1/2 in.
Drivers, material of centers	Cast steel
Truck wheels, diameter	36 in.
Journals, driving axle, size	9x12 in.
Journals, truck axle, size	6x10 in.
Main crank pin, size	6x6 in.
Piston rod, diameter	3 3/4 in.
Kind of piston rod packing	Metallie
Main rod, length center to center	10 ft. 4 1/2 in.
Steam ports, length	20 in.
Steam ports, width	1 1/2 in.
Exhaust ports, length	20 in.
Exhaust ports, width	3 in.
Bridge, width	1 1/2 in.
Valves, kind of	Allen-Richardson
Valves, greatest travel	6 3/4 in.
Valves, outside lap	1 1/2 in.
Valves, inside lap or clearance	0 in.
Valves, lead in full gear	3-32 in.
Boiler, material in barrel	Carbon steel
Boiler, thickness of material in barrel	5/8, 11-16 and 3/4 in.
Boiler, diameter of barrel	66 in.
Seams, kind of horizontal	Butt welt inside and outside
Seams, kind of circumferential	Double riveted



Ten-Wheel Passenger Locomotive—Cleveland, Cincinnati & St. Louis Railway.

MR. W. GARSTANG, Supt. Motive Power.

Built by the BALDWIN LOCOMOTIVE WORKS, Philadelphia.

Thickness of tube sheets.....	% and 1/2 in.
Thickness of crown sheet.....	3/8 in.
Crown sheet stayed with.....	Radial stays
Dome, diameter.....	30 in.
Fire-box, depth front.....	79 1/2 in.
Fire-box, depth back.....	68 1/2 in.
Fire-box, material.....	Carbon steel
Fire-box, thickness of sheets.....	3/8 in.
Fire-box, brick arch.....	No
Fire-box, water space, width.....	Front, 4 in.; sides, 3 1/2 in.; back, 4 in.
Grate, kind of.....	Rocking
Tubes, number.....	345
Tubes, material.....	Shelby steel
Tubes, outside diameter.....	2 in.
Tubes, length over sheets.....	14 ft. 9 1/4 in.
Smoke-box, diameter.....	69 in.
Smoke-box, length.....	68 1/2 in.
Exhaust nozzle.....	Single
Exhaust nozzle, diameter.....	4 1/4 in.
Exhaust nozzle, distance of tip below center of boiler.....	2 1/4 in.
Netting.....	Wire
Netting, size of mesh.....	2 1/2 x 2 1/2 in.
Stack.....	Straight
Stack, least diameter.....	16 in.
Stack, height above smoke-box.....	3 ft.

Tender.

Type.....	Swivel trucks
Tank capacity for water.....	6,000 gals.
Coal capacity.....	10 tons
Kind of material in tank.....	Steel
Thickness of tank sheets.....	1/4 and 5/16 in.
Type of underframe.....	Iron
Type of truck.....	Fox
Truck with swinging motion.....	
Type of truck spring.....	Fox tender truck
Diameter of truck wheels.....	36 in.
Diameter and length of axle journals.....	5 x 9 in.
Distance between centers of journals.....	6 ft. 4 in.
Diameter of wheel fit on axle.....	5 1/2 in.
Diameter of center of axle.....	5 1/2 in.
Length of tender frame over bumpers.....	23 ft. 11 in.
Length of tank.....	22 ft. 6 1/2 in.
Width of tank.....	9 ft. 6 1/2 in.
Height of tank, not including collar.....	60 in.
Height of tank over collar.....	66 in.
Type of back drawhead.....	Janney coupler
Without water scoop.....	

A 6,000 Horse Power Westinghouse Engine.

The engraving shows a 6,000 h. p. Westinghouse-Corliss engine lately built for the New York Gas & Electric Light, Heat & Power Company. It is one of eight similar engines for the Waterside power station of that company and is the largest Westinghouse engine yet built. The engine is of the inverted cross-compound type. The base consists of three rectangular pieces weighing in the aggregate 100 tons. Upon this base are set the three housings with circular flange tops, and bolted on the housings are the crosshead guide frames, of which there is one for each housing. Each guide frame is surmounted by its cylinder, there being one high pressure and two low pressure, the middle one being a high-pressure cylinder and the outer ones being low pressure.

The high-pressure cylinder is 43 1/2 in. in diam. and the two low-pressure cylinders each 75 1/2 in. in diam.; the stroke is 60 in. and the speed 75 r. p. m. The high-pressure cylinder is not jacketed, and from this cylinder the steam passes into a receiver 4 ft. 6 in. in diam. and 23 ft. in length over all; the volume of this receiver is 219 cu. ft. and it contains 110 tubes, giving about 1,200 sq. ft. of heating surface. This heater is horizontal across the rear of the guide frame portion. The low-pressure cylinders are steam jacketed.

The valves are all double ported and as close together as will allow of proper valve gear construction. The high-pressure cylinder has balanced poppet valves actuated by a releasing gear, and the low-pressure cylinders have Corliss valves operated by the usual wrist plate and tie rods. This unusual combination of valves was substituted for all Corliss valves because of the high temperature at which steam enters the high-pressure cylinder. This steam, which is under a pressure of 175 lbs., is superheated 200 deg., making its total temperature 577 deg. At this temperature it is practically impossible to provide the efficient lubricating necessary to the proper working of Corliss valves.

Each connecting rod is a steel forging and is 13 ft. 9 in. long between centers. The top end of each connecting rod is solid with wedge adjustment and the bottom end is of the marine type. The crosshead pins are 14 x 14 in. and the crank pins, 14 in. long, are 22 in. in diam. The cranks are of cast steel and are set at unequal angles, selected to give the best turning movement.

The main shaft is of open hearth, fluid compressed, hydraulic-forged steel, as are the connecting rods. They were supplied by the Bethlehem Steel Company. The shaft is 29 1/2 in. at the bearings, which are 26 x 60 in. This shaft is hollow and of 10-in. internal diam. at the wheel fit and 9 in. at the bearings. The total weight of the main shaft is 136,000 lbs.

A departure from ordinary engineering practice is in the way motion is given to the eccentrics, which are mounted on a lay shaft at the level of the first platform, which is driven by a spiral gear. The advantages of moving the eccentrics in this way are several, the chief one being the saving of energy by reducing the size of the eccentric straps. The diameter of the main shaft is 29 1/2 in., while the diameter of the lay shaft is 6 in.; the eccentric straps and the friction are reduced accordingly.

The fly wheel is of novel design and comparatively small, because a more uniform turning movement is given by the three unequally spaced cranks than is possible with two cranks. The center is of air-furnace iron, and the arms and rim of cast steel made in five sections, each comprising 72 deg. of rim and two of the 10 radial arms. These five sections are joined together by I-links shrunk into pockets and are bolted into the hub, forming a wheel 23 ft. in diam. and of 9 in. face, having a radial depth of 30 in.

Upon either side of this wheel are riveted, on its rim and flush with its face, five circular pieces of 72 deg. angular length each. These pieces are of 3 3/4-in. face and 27 1/2-in. depth, making a total face width of 16 1/2 in. These side segments are also fastened together by I-links, but the joints are broken with those of the central wheel rim. The peripheral speed is 5,416 ft. a minute.

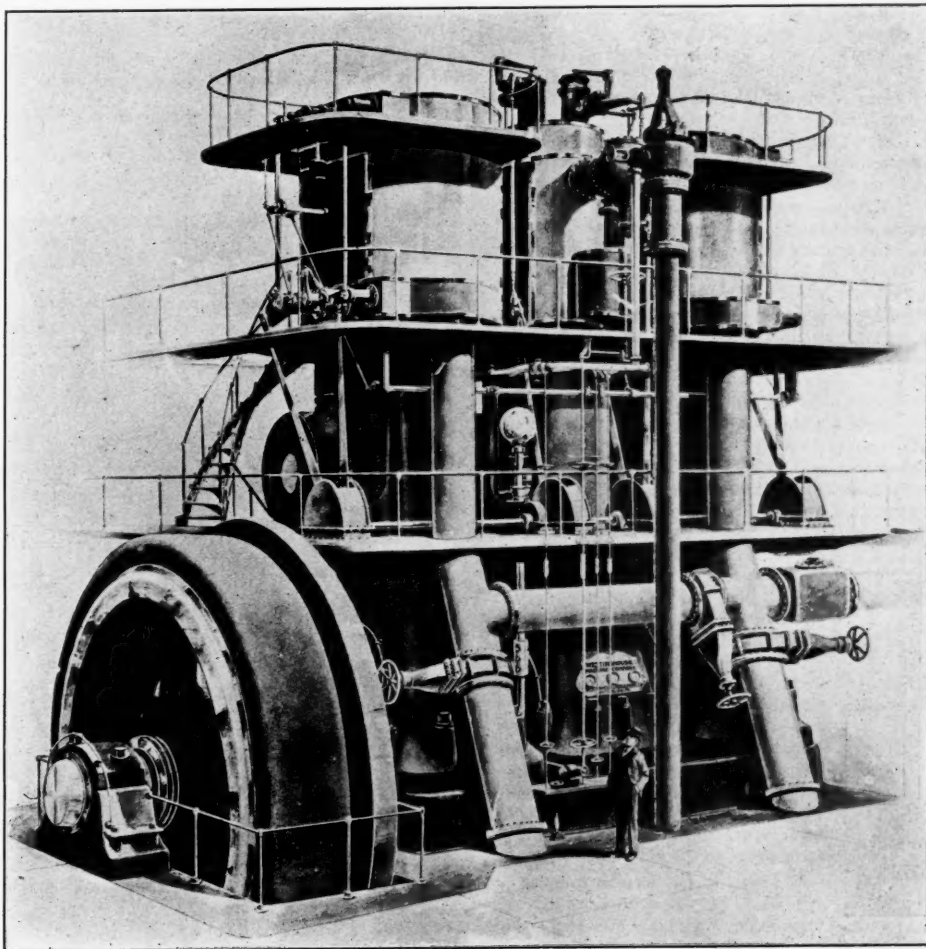
An automatic stop-valve is provided which shuts off the steam supply in case the speed exceeds any fixed limit. In outline it may be described as a valve which is closed by steam admitted through a three-way cock. In a pocket in the face of one of the high-pressure crank cheeks is pivoted a short, weighted lever, balanced against centrifugal force at normal speed by a helical spring. Should normal speed be exceeded the weighted lever flies out, and engages with a spring lever pivoted on the engine base. This action turns the three-way cock above mentioned, admitting steam to a chamber of the angle stop valve on the steam supply main, and this valve is promptly closed. There is also provision at a number of points about the engine for hand control of this same stop valve.

The engine is 37 1/4 ft. from the floor line to the top of the cylinders; 41 ft. across the front and 23 ft. from front to rear. Its entire weight is more than 750 tons, and above 15,000 separate pieces go to make it. This engine can deliver 10,000 h. p., which is almost double its most economical rating. Each engine is to be coupled direct to a 5,000 k. w. generator of the revolving field

which has enabled us to order a more satisfactory type for future use when the emergency is past.

Thirty locomotives were ordered during the year, and it will probably be necessary to order about this number annually for some years. The American offers were in every case the most favorable, but as American firms do not make engines to our standard designs our order for 10 was given to Messrs. Neilson, Reid & Co., of Glasgow, for a design prepared by our locomotive engineer, which seems likely to prove very suitable for heavy passenger, and perhaps also for light, fast goods trains. The time of delivery is, however, so long that it is a question whether we shall not have to give another order to America before they arrive; but I understand that the firm are making special efforts to anticipate their contract date."

Some comparisons between English, American and Belgian rolling stock are made by Mr. Trevethick (Mechanical Engineer). He says that the English make of rolling stock and machine tools has been largely and successfully used in Egypt since the commencement of its railways, and the working staff is thoroughly conversant with its use. Thirty-one English locomotives have been introduced since 1885, and 12 are shortly due; 10 are passenger engines, slightly exceeding the standard type in weight and power, and two are powerful trial engines—one passenger and one goods—weighing respectively 65 and 68 tons (working order). English rolling stock also includes 70 first class carriages and 600 wagons.



A 6,000 Horse Power Westinghouse Compound Engine.

type. The armature of this generator is to be pressed on the shaft alongside the fly wheel, and in addition to being securely keyed to the shaft it is to be rigidly attached to the fly wheel hub by means of direct bolting. The outer end of the generator shaft is to be supported by a heavy pedestal carried on an iron sub-base.

American Rolling Stock in Egypt.

From Lord Cromer's annual report on Egyptian affairs we get the following particulars: Major Johnstone, Director of Railroads, says: "Of the improvements which have been effected during the year, that which has had the greatest effect is the putting into service of 200 30-ton American wagons, ordered by my predecessor. The result has exceeded my anticipations; the complaint of want of wagons has almost ceased to exist, mainly owing to the great addition to our carrying power, which is represented not only by the capacity of the wagons, but by the fact that, owing to their extreme lightness, our goods engines can draw 20 per cent. more net load in these than in our ordinary stock. . . . A little too much has been sacrificed to lightness in points which are, perhaps, of small importance in the United States, but of considerable importance here. These, however, are all minor matters, and are well worth sacrificing for the great gain in carrying capacity obtained in a short time and at very small cost. The wagons have successfully met the special exigency for which they were ordered, and they have also given us experience

The equipment of American make now in use is 20 locomotives and 300 wagons, and there are 22 locomotives which have not as yet been put into traffic. The 20 locomotives in use are of the freight type, and inasmuch as they have already run an average of nearly 70,000 miles without having entered the workshops for general repairs, they have earned for themselves a satisfactory reputation as regards design and quality of material. The 22 American engines on order consist of two trial engines—one passenger and one goods, of 65 and 67 tons weight respectively (working order)—10 passenger and 10 shunting engines. The two trial locomotives were supplied by Brooks, the remaining 40 by Baldwin.

The make of American and English locomotives differs so widely that it does not follow that two engines, one American and one English, of similar weight and power, and equally good in design and quality of material, should give the same good result in a strange land, where, for many years, the staff has been accustomed to the use of the latter type; the American engines appear to consume more coal. These conditions in a country where the mechanic adapts himself slowly and unwillingly to changes, and where coal is expensive (25s a ton), must ever be important factors when comparing the utility of the English and American locomotive for use in Egypt.

From Belgium 202 locomotives have been supplied to the Egyptian Railway Administration since 1886. These 202, although (with the exception of 24) constructed to the same drawings and specification, and exactly similar, so far as the eye can judge, to 28 others of English make,

have given very different results. The difference has been most marked in the case of the boiler tubes. A comparison of the boiler tubes of 74 passenger engines, which are apparently identical, shows that the life of the tubes of the 18 engines of English make has averaged nine years and eleven months and 264,356 miles, as against six years and six months and 183,743 miles in the case of the 58 engines of Belgian make.

Some Characteristics of Waste Packing.*

BY T. H. SYMINGTON.

A large amount of money is expended annually on waste for packing journal boxes, the price of this waste ranging through the various grades of cotton and mixtures of wool and cotton from 3½ cents for cheap cotton to 12 and 15 cents for the best wool. The present method of grading waste is by the "feel," and its general appearance and freedom from dirt. This very crude method of grading, and the desire to cheapen this item of expense, led the writer to some investigations which were interesting in their results as giving a more exact method of determining the value of various wastes for this purpose.

The qualities in the waste that are to be considered are:

1st. Its capacity for holding oil, or its absorbing qualities.

2nd. Its elasticity when saturated with oil to the normal condition of packing for journal boxes.

3rd. Its capacity for lifting oil by capillary attraction, or wick action.

4th. The height to which this capillary attraction will raise the oil.

5th. The length of fiber and the amount of twist in strands.

6th. Freedom from dirt and shoddy material that is liable to pulverize.

For this investigation, 29 samples of various qualities of wool waste and 17 samples of cotton waste were collected from manufacturers and railroad companies and tested in the following manner.

Absorption Test.—One pound of each kind of waste was soaked in ordinary Galena car oil, at a temperature of about 65 deg. F. for 30 hours, and allowed to freely drain for 10 hours, after which the samples were weighed and the increase in weight in pounds of each sample represented the absorption in per cent. of that sample. For the wool waste the per cent. of absorption varied from 237 to 575 per cent., with an average of 325 per cent. For the cotton waste the per cent. of absorption varied from 403 to 575 per cent., with an average of 491 per cent.

Expansion Test.—In this test, each sample of waste, soaked and drained from the absorption test, was placed in a tin bucket, shown by the accompanying engraving, 8 in. in diameter, and compressed by the use of a dasher and constant weight to about the tension of waste in a journal box, and allowed to stand for two hours. The height of the dasher from the bottom of the bucket was measured, and when the weight was removed from the dasher, the amount of rise of the dasher represented the expansion of the waste. For the wool waste this expansion varied from 8 per cent. to 39 per cent., or an average of 22 per cent. For the cotton the expansion varied from 8 per cent. to 26 per cent., or an average of 15 per cent.

Capillary Tests.—Fresh samples of dry waste of each kind were compressed in a similar bucket to that used in previous test, with the bottom of the bucket perforated with a number of holes. The waste was compressed by the use of the dasher and weight, and the bottom of the bucket placed just below the surface of a large tank of oil, and allowed to stand for 10 hours. The waste was then removed and weighed, and the increase in weight in pounds for each sample represented what might be termed the capillarity of the waste in per cent. For the wool waste this capillarity varied from 25 per cent. to 137 per cent., with an average of 88 per cent. For the cotton the capillarity varied from 37 to 215 per cent., with an average of 131 per cent.

Height of Capillarity.—To determine the vertical height to which oil would rise in the various wastes, a small sample was placed in a glass tube of about 2 in. in diam. with an open bottom. The waste was compressed in this tube uniformly, and the bottom of the tube allowed to come in contact with oil in a large tank. After standing for 10 hours it could readily be seen through the glass how high the oil had risen by capillarity in the waste. With the wool waste this height varied from ¾ in. to 2½ in., with an average of 1.28 in. For the cotton it varied from ⅝ to 2⅝ in., with an average of 1.72 in.

Summarizing these results, we have:

Waste.	Absorption.			Expansion.			Capillarity per cent.			Height of Capillarity.		
	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.	Max.	Min.	Aver.
Wool...	575	237	325	39	8	22	137	25	88	2.50	.75	1.28
Cotton...	575	403	491	26	8	15	215	37	131	2.37	.59	1.72

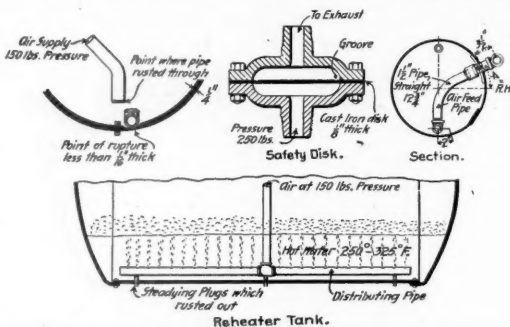
It will be noted that the absorption, per cent. of

capillarity, and height of capillarity of the cotton waste is considerably in excess of the wool. The expansion of the wool, however, is considerably higher than the cotton. This elasticity has been considered so essential that the expensive wool has been used almost universally instead of cotton in American railroad practice. Practically, the principal trouble with cheap waste seems to be that it goes to pieces in the boxes on account of being of very short fiber and shoddy material, resulting after a year's service in a pulpy, inert mass. The long fiber pure wool does not go to pieces, but retains its form and elasticity, and is therefore much superior to the shoddy material. The capillarity of the waste seems also dependent upon the length of fiber, as the oil feeds the length of separate fibers, but will not jump from one fiber to another.

One practical trouble with cotton waste has been that it would roll up in the box, leaving parts of the journal entirely. The logical conclusion from these tests is, that if the cotton waste is held mechanically up to the journal, independent of its own elasticity, and is also held in the box so that it cannot roll up in knots, it would be as efficient packing as wool; and as the cost of the cotton is so very much less than the wool, this would seem to open a field for large saving in the operation of cars. Several large roads have recently realized that with the ordinary boxes there is not a sufficient difference in the results obtained from wool over cotton, to make it desirable from an economical standpoint to use wool at all. The elasticity of the various wastes depends principally upon the tightness to which the strands are twisted, and on account of the variation in the elasticity of various kinds of cotton waste, it would be well in ordering such waste to specify that the expansion be not less than 20 per cent. in a test similar to the one outlined above.

The Accident to a Compressed Air Car in New York City.

The reader will remember that a couple of months ago there was an explosion in a compressed air car running on 28th and 29th streets in New York City. At the time we stated briefly the cause of this explosion. We find now in the May issue of *Compressed Air* the following intelligent explanation of the accident, which, it will be seen, was entirely due to bad mechanical design and had no relation whatever to the use of compressed air as a motive power. The President of the Compressed Air Company says that the heaters on these cars are now being changed and the moving parts of the machinery



Details of Reheater Tank as Used on Compressed Air Cars.

strengthened. The platform devices are also being simplified and the running gear is being strengthened in general. The following is the text of the account of the accident as published in *Compressed Air*, and the engravings are reproduced from that journal.

"Attention has been drawn to an accident which occurred to one of the compressed air cars of the Metropolitan Railway System, operating on the 28th and 29th streets cross-town line in New York City. . . . We have very thoroughly investigated the accident on our own responsibility and take pleasure in stating the absolute facts of the case. . . .

"March 27, about 5:40 a. m. car No. 592 was run out of the station by the 'hostler,' as is customary, preparatory to starting on its regular run cross-town, when without warning there was a loud explosion, which damaged the car and broke a window of a saloon opposite where the car was at the time. Aside from the broken window in the saloon and the injury to the car there was no damage done. The car was at once returned to the station for repairs on its own wheels and was put in operation within a short time at the total repair expense of \$25.86. This cost included all work done in repairing the damage and in making certain adjustments of parts which are made at frequent intervals in any case. This amount, \$25.86, was made up from the time slips of the men engaged in the work and is exact. It effectually refutes the statement that the car was blown to pieces, etc.

"In order to understand this accident and to appreciate its peculiar character we present sectional views of the reheater tank which was the part of the apparatus that exploded. . . . As the ultimate efficiency in the use of compressed air is very largely increased by heating it just previous to its actual use, these reheaters are essential. The air under a pressure of 150 lbs. passes over and down through a tube inside of the tank to the branch pipe seen at the bottom. This branch pipe has a series of small holes drilled in its upper side and extends nearly the entire length of the tank. As the air issues from these holes it bubbles through the hot water with which the

tank is partially filled and collects in the tank over the water surface at a temperature of perhaps 250 or 325 deg. From here it is drawn to run the engines.

"The perforated pipe or distributing pipe inside of the tank is held in place by three studs which screw through the tank and into the pipe. Owing to the constant jarring due to the vibration of the car, this pipe broke away from its supports and the central pipe and dropped to the bottom of the tank. The constant stopping, starting and jarring of the car resulting from a travel of about 90 miles per day for about two months caused this tube to shift back and forth and wear on the bottom of the tank. Singular as it may seem this wear was sufficient to reduce the thickness of the tank on the bottom from its original thickness of ¼ in. to less than 1-16 in. for a distance of 5 ft. This thickness was insufficient to stand the working pressure of 150 lbs. per sq. in. and simply gave way; the tank bursting on the bottom along its entire length allowing the water to be thrown into the street with considerable force and noise, but without any material damage to the car or surrounding objects.

"The pipe and the tank have been carefully examined by us and the accompanying sketch affords an idea of how this wearing occurred and its exact location. This defect of construction was being remedied and the cars were being taken off one by one to have the pipe fixed so that it could not get loose inside of the tank. . . .

"The statement has been made that the real cause of the explosion was the failure of the reducing valve to work perfectly and the consequent discharge of air under 2,000 lbs. pressure into this reheating tank which is built to withstand only 300 lbs., the working pressure being only 150 lbs. Such an accident is an impossibility for the reason that the tank has two safety valves attached directly to it. One set at 175 lbs. or 25 lbs. above the working pressure and one at 200 lbs., or 50 lbs. above the working pressure. In addition there is a special safety disc which is so constructed that the pressure cannot possibly go beyond about 250 lbs. without bursting. The disc performs the same function as the 'fuse' in an electric car. This is nothing more or less than a cast-iron disc about ¼ in. thick and 3 in. in diam. which is placed over the end of the pipe connected with the receiver in such a manner that if the pressure exceeds the set figure (250 lbs.) the cast-iron plate bursts, exposing the entire 3-in. opening, which is amply large to allow all of the air in storage to escape harmlessly.

"The hot water contained in the reheater tank is heated by allowing steam to pass into it at the charging station. As this steam is taken direct from the boilers of the power plant the working pressure of which never exceeds 150 lbs. it will be seen that there is no possibility of the water pressure of itself exceeding the amount due to a temperature of from 300 deg. to 325 deg. F., or about 85 lbs. per sq. in.

"We had the pleasure of riding on the car which was reported to have been blown to pieces, and aside from two new window panes we were unable to find any evidence of the accident."

The Duties of a General Manager.*

BY L. E. JOHNSON, General Manager Norfolk & Western Railway.

"Whatever comes to your hands, do it with all your might." This Scriptural injunction might be taken as a motto of every successful railroad man; as success in this business means strenuous, patient and intelligent application to all matters, whether great or small. In most callings, when men reach an eminent position, they can discard small matters, but in the railroad manager's life there is no matter so small as to be trifling. . . . Railroad management, more nearly than anything else, carries with it the lesson that thoroughness is the best and surest guarantee of success.

If you will think of a tree with three large roots, and each of these roots spreading into other roots, and they in turn being broken up until thousands of small branches permeate all the ground about, you will have a fair picture of the organization of a great railroad. The three main roots we will call—Traffic, Operation and Finance; each tributary to the same trunk, but each going in a different direction, and each supplied by different sources. To drop the metaphor and take these separately, the operating of a railroad is that department which has charge of the movement of trains; this involves the care of the track, bridges, buildings, telegraph lines, yards and depots, etc. The traffic department is that which provides freight and passengers, and thus the revenue upon which the road is dependent for its life; and the finance department, as the name implies, takes care of the enormous system of bookkeeping and accounts that is involved in the proper running of such a corporation. . . . [Mr. Johnson described the financial and administrative organization of a railroad at considerable length.]

The daily routine of a great road embraces everything from the pathetic to the ludicrous; from deeds of sublime heroism to cheating and fraud of every description. A few instances may be of interest to you.

Some time ago a man fell upon the depot platform, dislocating his hip. The railroad company had him carried to the best hotel in the town; employed trained nurses, and gave him all the attention that care and

*A few passages from a lecture delivered at Purdue University.

skill and science could suggest, and arrangements were being made to amply compensate him in money. It was discovered, however, that this man was enabled to throw his hip out of joint, and that he practically made a business of doing so, thus obtaining money from railroad companies. He had already in this way received several thousand dollars from different companies, when my experience with him commenced. . . .

In another instance there was a collision, due either to the fault of the telegraph operator at a signal tower, or to the fault of the crew of the train. The engineer, conductor and train crew stated positively that signals had been given them as the rules required; against these five or six statements was only the word of a young boy, who was operator in the signal tower at a remote point in the mountains; yet on account of various small matters, such as telegrams to the despatcher, immediately before the accident, words dropped by members of the train crew in conversation, the management of the road was constrained to decide that the operator was telling the truth and that the train crew were lying, although in deciding that, they had the fact against them, that by running against the signals, the train crew imperilled their own lives. There was not another human being that saw the accident except the crews involved and this young operator, and yet it was proved and afterwards admitted, that he and he alone had told the truth and the whole truth about the matter.

The following remarkable case was tried in North Carolina. A man was walking along a railroad track on his way to a turkey blind, with a double-barrel shotgun loaded with turkey shot; a fast express train came along, the man stepped to one side—a little scrub North Carolina bull at the same time stepped on the track, the engine struck the bull, threw him 20 or 30 ft., hitting the man and throwing him in a pond of water, which saved his life; his gun was thrown from his hands, discharged, killed one cow and fatally wounded another. Result: the man sued the railroad company for damages for being hit by the bull, claiming that the railroad company had negligently and carelessly thrown a bull at him, doing him serious bodily injury. The owner of the cows sued the man for killing his cows. The Court decided that the railroad company could not be held to have anticipated such an accident and, therefore, decided that case in favor of the railroad company, but decided that the owner of the cows could recover \$100 for the loss of the cattle.

A passenger train was passing over a bridge; two Pullman cars jumped the track on a curve and went off the bridge into the river falling 25 or 30 ft.; the river was very high; the trucks dropped from the cars, and the water getting in very slowly on account of the double windows and tight doors, the cars floated several hundred feet down the river, gradually filling with water. The men broke out through the ventilators at the top of the car, and were able with assistance from shore to rescue passengers. It was very early in the morning, before the passengers had got up, and a gentleman who was on the train stated that when the car was nearly filled with water, he observed two ladies, who had been unable to get any clothes, except what they were sleeping in, hanging by the rod which supports the curtain of the berths; that these two ladies had their hair up in curl papers, and the water was nearly to their arm-pits. When they were rescued, it was found that they had got the papers out of their hair, which was arranged nicely; in other words, they had managed to swing with one hand, and with the other take out the curl papers. They at least proposed to look well when drowned.

Amongst the passengers was one man who was very active in aiding the company in resisting claims for losses of baggage, etc., there having, of course, been many claims put in for enormous amounts. This man apparently was doing everything possible to aid the company, and one day was asked what he had lost. He said he had a satchel which contained a good many clothes, including a good deal of silk underwear. For this, however, he made no claim, being glad enough to get off with his life, but he said he had a new watch and some jewelry which he had bought, to the value of about \$250, for which he would like to be paid at the company's convenience. He had been so helpful, energetic and active that he was immediately given his \$250. When the river went down and the car was brought up, this man's satchel was found. Its contents consisted of a dirty shirt, a pair of socks, two collars, a pair of cuffs, and a half bottle of whisky. It is supposed that it was the whisky which he considered to be his jewelry.

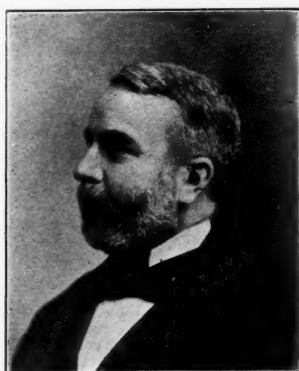
The day of a general manager is not only a very busy day, but it is a day of varied duties. I took occasion to take my letter book for one day and made a memorandum of the subjects about which I had written, and I will read it to you. [Mr. Johnson gave a list of 45 different subjects.] These are only the subjects about which I wrote, and do not include consultations, conversations and reports. This is only an average day taken at random, and you will see that in that day almost every subject connected with the management of a railroad was presented for consideration and determination; a determination which has to be prompt, and to be correct. As I stated a few moments ago, the day is filled with pathetic as well as light matters. The widow and fatherless children one moment begging for assistance to reach their homes and friends, to be followed immediately after by the smooth gentleman

who has come, as he would express it, "to work the General Manager."

You may ask what is the training and what is the particular qualification of the men that operate these great systems, and may, in view of the character of the work which I have pointed out to you, ask what benefit am I to gain by the time and work spent at school and college, or institutions like Purdue? I will answer you, that in my judgment you will gain nothing whatever, but, to the contrary, it is and must be a waste of time, unless you can apply with your education good, sound, practical sense to whatever you may undertake in after life. It is said that Chief Justice Marshall was once dining with a number of the legal fraternity, including judges and lawyers, when the question was raised as to which was the most important and necessary qualification for a good lawyer. Various views were expressed, as a full knowledge of the law; a complete mastery of the English language, knowledge of Latin, a fine physique and voice; the ability to examine witnesses and similar views. Finally, some one asked the opinion of the Chief Justice. His reply was that all these things were important qualifications, but that in his opinion the most necessary was strong, common sense. I am a firm believer in the necessity of the coming generations of business men being well prepared by education, and I believe that this, coupled with good judgment and executive ability, and a full determination to master each subject as it comes before them, will make a stronger and better civilization, and make this country of ours the foremost country in all that pertains to civilization. . . .

The President of the American Locomotive Company.

Mr. Samuel R. Callaway has resigned his office as President of the New York Central & Hudson River Railroad to accept the presidency of the new company



organized to take over all of the principal locomotive works of the United States, except the Baldwins. The particulars of this organization appeared in the *Railroad Gazette* of May 17, page 338. Of course, it is impossible for us to say anything new about Mr. Callaway to the readers of the *Railroad Gazette*, for in 1898 (p. 299) we published quite an account of his life. It may be as well, however, to refresh their memories as to his railroad career, which began in 1863 on the Grand Trunk. He served there as clerk in various departments, chiefly financial, for six years, then became Chief Clerk to the Superintendent of the Great Western Railway, and later to the General Manager.

In 1874 he began his own administrative work as Superintendent of the Detroit & Milwaukee. He then served as General Superintendent of the Detroit, Saginaw & Bay City, as General Manager of the Chicago & Grand Trunk, and president of the Chicago & Western Indiana, then as Second Vice-President and General Manager of the Union Pacific, President of the Toledo, St. Louis & Kansas City, and President of the New York, Chicago & St. Louis. From the latter road he went, in 1897, to the Lake Shore as President, and in April, 1898, he was made President of the New York Central.

It will be seen that he has come up in the old-fashioned way and has won his position as a railroad administrative officer by long and arduous apprenticeship. It seems a sagacious move for the new company to secure a chief of Mr. Callaway's type and ability.

Foreign Railroad Notes.

Among the wedding presents to the young Queen of Holland was an entire "court train" of cars, consisting of two parlor cars, a baggage car and kitchen car. The donor was the Dutch Railroad Company.

In August, 1899, in the Hungarian town Klansenburg, several cars broke loose from the locomotive on a steam street railroad and ran down the track across the chief public square of the town, knocking down and injuring two factory operatives. The Superintendent of the road was arrested, tried and condemned to a year's imprisonment for causing the accident by carelessness. On appeal he was acquitted, but the case coming to the highest court, he was sent to prison for six months.

Keeping the Journals of Heavy Locomotives Cool.

In a short paper on this subject, read by Mr. John Medway at the March meeting of the New England Railroad Club, he outlined briefly some causes of hotboxes and suggested some remedies. Among causes of hot boxes mentioned are lack of proper care and attention in regard to lubrication; poor quality of oil; unsuitable material in journal bearings; and faulty design and mechanical defects in journals and bearings. In the abstract it was the author's opinion that perfection though not always attainable in these parts was well worth striving for; that the quality of materials should receive careful attention, and that good results are obtained by rolling journal bearings after the usual lathe work is finished. The truing of journals when the wheels are removed he thought is too often neglected, and, while it is desirable that the bearings should be made of the best material obtainable, in many cases it is impossible to so make them at the prices that are paid, and insisting on a low price for castings gives an incentive to dishonesty on the part of the foundrymen. Referring to the discussion at the last convention of the Master Mechanics' Association, on the best composition for driving box brasses, the writer suggests that from the several formulae presented a good average may be struck, as copper seven parts, tin one and lead one. Phosphor bronze of the following formula is said to have given excellent results: Copper 79.7, tin 10, lead 9.5 and phosphorous .8. A pressure of six or seven tons is thought to be sufficient for pressing in driving box bushings.

In the opinion of the author the old-time practice of fitting the brass snugly all around, then scooping out the crown bearing invites a hot box, and he does not agree with the practice of placing strips of soft metal in the driving brass, believing that babbitt metal makes a smooth bearing, but is uncertain and may at any time melt and make trouble. In regard to the location of oil holes and grooves it is said that the plan of leading the oil holes to a recess running longitudinally along the crown of the brass and connecting them with a recess on each side of the brass has, as a whole, proven unsatisfactory. The recesses are said to have filled with dirt and loose waste and the holes being so much deeper are not as readily kept open. Then, too, a recess in the crown induces wear in that direction and the side recesses from the same cause produce side play and consequent "pound." A slide in the inner wall of the driving box cellar is thought to be an excellent thing to facilitate examination and emergency packing.

Ashes from the fire-box, ashpan and ash pit are thought to be a fruitful cause of hot boxes and attention is directed to the advisability of keeping the ashpan tight against the boiler leg and fitting a plate loosely over the driving box. The usual consideration was given to the care of packing in the driving box cellars and the quality of oil. It was thought that however much opinions may differ as to the best materials and designs for the driving box and its accessories a great measure of success in avoiding hot boxes is due mainly to constant care and watchfulness on the part of men in charge. It was recommended that oil holes should be cleaned and the packing on the top of the box be examined, cleaned and oiled daily; and that the packing in the cellar should be looked after about once a week. Especial care of the driving boxes of a locomotive just from the shop was advised, in order that cut journals and all the after trouble therefrom until the engine is again shopped may be avoided.

In the discussion which followed the presentation of the paper opinion was about evenly divided as to the top or side location of oil holes, and other features of the subject were discussed in general along the beaten lines of such argument. The following statement by Mr. John M. Deane, in regard to practice on the Boston & Albany, is of interest:

"In regard to the location of the oil grooves used on the large driving boxes with wide bearings, I think those placed on the side are in the proper place; and that, if the driving boxes are fitted too closely on the journals, they will give trouble in heating. One cause is that the bearing is so wide there is a little twist in the box, which is not perceptible when it is fitted up in its place. But when it moves around, it makes a little friction on the two opposite sides, with the result that you have a hot box.

"I know our practice out at the Allston shops is to use a little larger diameter of box than the journal, then any slight imperfection is relieved by wear; as a general rule, we relieve them a very little in the crown, as the natural tendency of the journal is to wear in the center. I find in a good many cases with boxes that are babbitted, that if you can keep them free on the start, they will wear much longer than any solid box. With a box of solid metal, the tendency is to wear more in the crown and more closely on the sides. We make a practice of boring our driving boxes slightly over one hundredth of an inch larger than the diameter of the journal, and we have very much better success than when we fitted them closely on the journals.

"With boxes fitted close to the journals, the engines would run all right on a trial trip, and possibly one or two days on their trains, and then without any apparent cause a hot box would be found, and the engine temporarily laid up; while with those boxes bored larger and fitted more loosely (which is not perceptible in running the engine) as a general rule, they run cool and give no trouble.

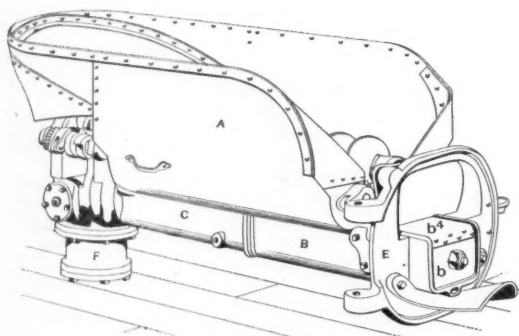
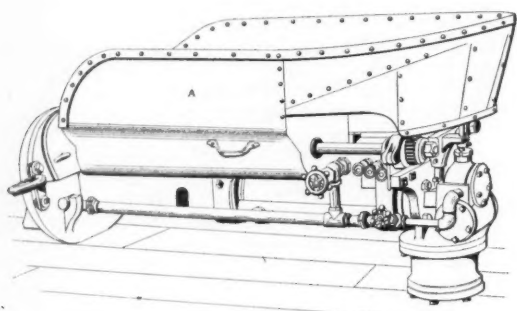
"As regards the smaller engines, with correspondingly

smaller journals and much narrower boxes, we fit them a great deal closer, and find they will run cool in almost every case.

"In the matter of truck journals, with about one-third bearing in crown, good babbitt metal is about as successfully used as anything. We raise the seat on the hood of the box with babbitt about one-quarter to three-eighths of an inch, and when it begins to wear on the composition, it is time to remove it."

The Kincaid Locomotive Stoker.

The subject of mechanical stoking on locomotives has always been an inviting one, and we illustrate herewith the Kincaid locomotive stoker, made by J. H. Day & Co., Cincinnati, Ohio, which has been put to practical test in locomotive operation with both simple and compound engines in different parts of the country. We learn from the makers that the stoker has been used on long and short runs of both passenger and freight engines and that it has proved efficient. Their observation thus far is



The Kincaid Locomotive Stoker.

that it is possible to save from 10 to 20 per cent. of fuel over careful hand firing and from 20 to 50 per cent. over careless firing. The makers of the device have tried to avoid picked or favored runs and to test it in average everyday service. One advantage that is claimed for it is that there is no need of brick arches in the fire-box, and also that the fire door is not opened and does not admit air to the flues and crown sheet as in hand firing. The machine is said to distribute coal evenly over the entire grate area and to leave a very light and even fire on the grates at the end of runs as great as 150 miles.

From the group of illustrations it is apparent that the machine consists of four principal parts, namely, the hopper A; a trough B; a stoker engine cylinder C, with its steam chest and valves D, and a controlling engine F. The lower part of the hopper is in the form of two semi-cylindrical channels, in each of which is a spiral conveyor having shafts journaled at the front and rear ends. The upper part, which is a convenient funnel shape to hold the coal, is also shown. The hopper hinges on the journals of one conveyor shaft so that the whole may be swung to one side when it is necessary to fire by hand through the small door E, as, for example, when the engine is standing in the roundhouse. The bearings of the conveyor shaft upon which the hopper hinges are integral with the brackets which are bolted to the stoker cylinder and to the trough.

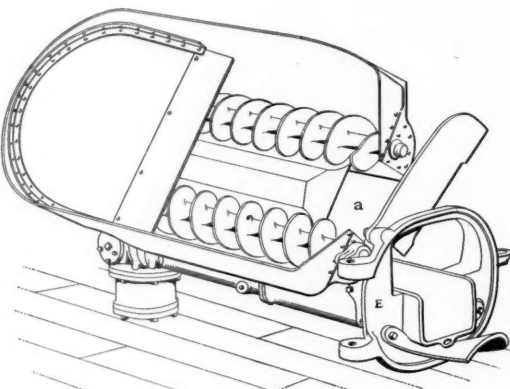
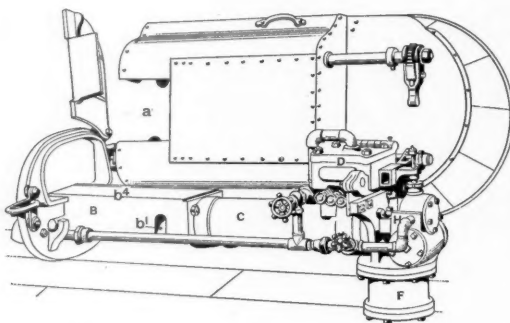
The twin spiral conveyors feed the fuel toward the forward end of the hopper and from there it passes through an opening *a* in the bottom, falling in the trough in front of the plunger *b*, unless the plunger is extended and delivering the previous charge of coal to the furnace. In the latter case the coal falls upon apron *b-1*, which is attached to the plunger and reciprocates between the hopper and cylinder of the main engine for the purpose of closing the hole *a*, to prevent coal from falling behind the plunger head.

When the piston is drawn back, carrying the plunger at its end and the apron which is secured to this plunger, the coal drops into the trough and is carried forward into the furnace at the next stroke. The trough has a small opening *b-1* in the bottom, at the end nearest to the cylinder, through which any dust which may accumulate behind the plunger is discharged.

Integral with the rear head of the cylinder is the valve chest H of the controlling engine. The controlling engine is set to act vertically and, on the upper end of the

piston rod, has a crosshead which operates two ratchet levers pivoted on the conveyor shafts. On the rear face of the crosshead is a projecting lug arranged to operate the stem of a small controlling valve through two adjustable collars which it engages on its upper and downward strokes respectively, moving the controlling valve to admit steam to the proper end of a floating valve which, in turn, admits steam to the cylinder. In this way the conveyors are moved intermittently by the controlling engine, each downward stroke of which moves the conveyors one or two teeth.

On the shaft of the conveyor and immediately in front of the ratchet is a series of cams that operate levers opposite the ends of the valve stems. On the left side of the steam chest are three small throttle valves. As the conveyor revolves it opens a valve for a light stroke of the plunger. Two valves are opened simultaneously for a stroke of second speed; and three valves opened simultaneously give the stroke of greatest velocity, delivering the coal to the forward end of the furnace. Only one of these valves has a steam port leading to the furnace end of the cylinder. By this arrangement of valves it is easy



to control the firing by regulating the speed of the controlling engine. Should the fire bank in any part of the fire-box the distribution of the coal may be changed at will by varying the effective port openings by means of the three throttle valves.

The machine carries two lugs which secure it to the furnace door in such a way that it may be removed and drawn back on the tender in case of accident to it, and thus allow the engine to be fired by hand without delay. The stoker has been disconnected a number of times in about one minute for each operation. The locomotive may also be fired by hand without removing the stoker, by turning the hopper to one side, as shown in one of the illustrations.

Each machine is fitted with a furnace door having standard hinges and latch and of the desired shape and size, with an opening through it of proper shape to receive the end of the machine. There is bolted to the inner face of the door a conical deflector which is part of the device for uniform distribution of the coal over the grates. One of the illustrations shows the shape of the front end of the hopper as it is cut to enable the fireman to lift the small door and use the fire hook without turning the hopper aside. A hood is attached to the hopper under the rear and reaches down and covers the working parts, as illustrated in one of the other views. Steam is supplied through the pipe which is shown as running the length of the stoker below and at the left of the trough, and near the lug which attaches the stoker to the fire-box is a union which connects with the pipe leading to the top of the boiler head. This pipe may be attached to either the heater or blower pipe or to a separate pipe specially provided for the purpose.

Emergency Surgery on the Union Pacific.

General Manager E. Dickinson, of the Union Pacific, has issued the following circular, which explains itself:

"Believing that much suffering may be prevented by employees being conversant with the proper course to be pursued in rendering immediate temporary relief to injured persons in emergency cases where surgical aid is not quickly available, it has been decided to perfect an organization under the jurisdiction of the Surgical Department for the purpose of furnishing systematic instructions on the subject, the members of which will be able to act in a competent and practical manner when the

necessity arises. A general idea of the plan is outlined below:

"1. The Association will be known as the Union Pacific Emergency Association.

"2. The object of the Association will be to render immediate aid and assistance to employees, passengers and others who may be injured (or become suddenly ill) while on the premises of the company.

"3. Any employee is eligible to membership in the Association, and is entitled to receive free instruction.

"4. Classes will be formed and free instructions given by a properly qualified surgeon.

"5. The company will furnish materials free of charge.

"6. A lecture course, comprising five lectures on 'First Aid to the Injured,' will be given at convenient points and at such intervals as may be considered most suitable.

"7. Ambulance and transport corps composed of members who have attended the regular course and passed a satisfactory examination, will be organized at convenient points.

"It is earnestly hoped and desired that employees in all departments will take an active interest in this work by joining the classes, attending the lectures and studying the manual instructions which will be furnished to each member of the Association, and thereby acquire a knowledge that will enable them to render valuable and efficient aid to suffering humanity in emergency cases."

The Central Railway Clearing House.*

The Clearing House principle was introduced into the through freight traffic accounting departments of the New York Central and its leased and operated lines, at the instance of Mr. John Carstensen, Comptroller. The Buffalo Clearing House was organized on Feb. 21, 1899, at a meeting of the Chief Accounting Officers and Auditors of Freight Accounts of the several roads, in New York City. The original membership was as follows: New York Central & Hudson River; West Shore; Lake Shore & Michigan Southern; Michigan Central; New York, Chicago & St. Louis; Pittsburgh & Lake Erie.

The object was the clearance of freight revenue balances, accruing between these roads, on all interline, joint and fast freight line traffic, passing through Buffalo, or crossing the Niagara River at Black Rock and Suspension Bridge, billed on a through waybill; and to keep the accounts of the New York Central and West Shore Fast Freight lines.

The complete and proper revision of all billing.

The compiling and furnishing to the Accounting Departments of the roads, with all statistics, statements of earnings, etc., required by them from time to time, and the furnishing to other roads not members such information and statements as formerly were required from the New York Central and West Shore Fast Freight lines.

The checking and recording for the roads members of the Clearing House, and the New York Central and West Shore Fast Freight lines, of all Joint or Fast Freight Line claims.

The keeping, under the supervision of the Manager, of complete records of clearing house and fast freight line business.

All freight agents of companies members of the clearing house, to be considered as agents of the clearing house, and to respect and comply with all orders of the manager thereof, consistent with the accounting regulations of the clearing house roads.

Clearing house traffic, other than fast freight line, to be waybilled exclusively without divisions of earnings, on a special clearing house waybill, to be used by all roads for business within the clearing house territory.

The clearing house to use, whenever practicable, the standard blanks of the Association of American Railway Accounting Officers.

The supervision over the clearing house is vested in an executive committee consisting of the Comptroller of the New York Central and the Auditors of the four roads west of Buffalo. The duties of this committee are:

(a) To act on all questions affecting the conduct of the affairs of the clearing house as constituted, or as it may be enlarged from time to time.

(b) In conjunction with the Manager, to decide all matters relating to expenses and the division of same as between roads in interest.

(c) To act on all applications for increased membership.

(d) To hold meetings upon call of the Chairman, or upon the request of any three members.

The membership of the Michigan Central Railroad was discontinued Dec. 1, 1899; and on May 1, 1901, the Cleveland, Cincinnati, Chicago & St. Louis and the Lake Erie & Western were admitted to membership.

The main function of the clearing house, to control the accounting of revenue on traffic passing the Niagara Frontier, has been satisfactorily accomplished. The results of the work have been promptly furnished to the accounting officers of the roads in accordance with their varied requirements in time for inclusion in their monthly records.

From time to time, the duties of the clearing house have been largely increased, and it now accounts for the revenue on traffic:

(a) Interchanged between the New York Central & Hudson River; West Shore; Rome, Watertown & Ogdens-

*Abstract of a statement prepared by Mr. William Nicholson, Manager of the Clearing House, for presentation before the Federal Industrial Commission at Washington.

burg; Pennsylvania Division of the New York Central; Mohawk & Malone; Walkill Valley; Beech Creek

and

Lake Shore & Michigan Southern; N. Y. C. & St. L.; C., C. & St. L.; L. E. & W.; and P. & L. E.

passing the Niagara Frontier.

- (b) Between the L. S. & M. S. and C., C. & St. L.
- (c) Between the L. S. & M. S. and P. & L. E.
- (d) Between the L. S. & M. S. and L. E. & W.
- (e) Between the N. Y. C. & St. L. and C., C. & St. L.

(f) Between the N. Y. C. & St. L. and L. E. & W.

(g) Between the B. & A.; B. & M.; N. Y. C. & H. R.; West Shore; R. W. & O.; Penna. Division of the N. Y. C.; Mohawk & Malone; Walkill Valley; Beech Creek; L. S. & M. S., and all Pacific Coast roads, where Transcontinental tariffs apply.

As regards the latter class, viz., Transcontinental traffic between the Atlantic and Pacific Coast points, the clearing house also acts for the Boston & Albany and Boston & Maine roads in the matter of accounts, the agents of these companies reporting to and being subject to the rules of the clearing house.

The revenue on traffic between Transcontinental tariff points on the Pacific coast and those within clearing house territory east of the Niagara River (including those on the Boston & Albany and Boston & Maine), via the Michigan Central, is also taken care of in the clearing house, but the proportion of such traffic to and from local stations situate on the Michigan Central, is accounted for by that company direct.

Prior to the organization of the clearing house, practically all business interchanged between the roads was settled for by the agents at junction points. The clearing house territory, so far as accounting interests are concerned, is now practically one railroad. The clearing house has no intermediate junction settlements whatever.

The system in vogue does more than the modern audit office plan in the way of economical, expeditious and simple settlement. Take for example, a shipment from Boston to East St. Louis. The old junction settlement plan would require stopping of the waybill at Albany, East Buffalo and Cleveland, for junction settlement between the roads handling the shipment. Under the modern Audit Office Settlement plan, it would be necessary for the Auditor of the C., C. & St. L. to render complete detail as to abstracts, division sheets, summaries, etc., to the L. S. & M. S., the N. Y. C. & H. R., and the B. & A. With the clearing house plan, the waybill would be reported (forwarded) by the agent at Boston, and (received) by the agent at East St. Louis, direct to the clearing house, where the same would be accounted for to the roads in interest. At the end of each month, the proper officer would be notified by it of the net debit or credit balance affecting the other roads for all waybills so handled in a given month.

The old method provided that each individual waybill should be divided and settled between the roads, while now all waybills in a month between given points taking given subdivisions, are brought to a total, which is subdivided. Considering the large volume of business handled by the clearing house roads, the delivery of shipments to consignees on proper rates is wonderfully increased, inasmuch as shipments are waybilled through without any division of revenue being shown on the waybills. As no junction settlements between agents are made no amounts are shown on the waybills as advance charges. It is, therefore, possible in case of error in a waybill for agents to correct the waybills when delivery of freight is made, to the basis of the proper through rates, as there are no advances paid connecting railroads, which, in case of error, would compel the receiving agent to secure authority to change before final settlement with consignees.

The clearing house obviates the multiplied settlements of the railroads, expedites the movements, and so far as the public is concerned, minimizes overcharges, and simplifies the accounting.

The clearing house system of accounting is based upon daily forwarded abstracts, daily received abstracts and monthly balance sheets, with the necessary auxiliary forms. Estimated railroad balances are drawn for weekly between the financial offices on figures furnished by the clearing house. A final net balance is drawn for at the end of each month. All moneys collected by the agents are remitted to the treasurers of the roads direct; no remittances on account of revenue accruing for freight transportation are sent to the clearing house.

The general supervision of the affairs of the clearing house is in the hands of the manager and his chief clerk. The work is divided into eleven departments, each in charge of a head clerk, as follows:

ACCOUNTING DEPARTMENT.

Employs nine clerks and takes care of the general accounts of the clearing house, as well as maintaining separate sets of general books for each of the New York Central and West Shore Fast Freight Lines, viz., the Red Line Transit Co., White Line Central Transit Co., Great Central Route "Blue Line," Canada Southern Line, North Shore Despatch, West Shore Line, Nickel Plate Line.

The cashier handles the receipts and disbursements account of the general expenses for the clearing house, as well as for the Fast Freight Lines specified above.

APPORTIONMENT DEPARTMENT.

Has 22 clerks. This department handles completed reports when received from the abstract department; stamps same with percentage stamp, showing proper percentages

to be applied between points shown thereon. These items, shown in blocks, are drawn off on apportionment sheets, grouped as per stations from and to. At the close of business each month, these sheets are footed, summaries balanced with abstract department, and revenue apportioned among all roads interested, on the basis agreed to by the roads.

Interline audit-office settlement accounts for all our nine roads, in connection with the 49 roads west of the clearing house territory, are handled by this department.

STATISTICAL DEPARTMENT.

Compiles road statistics and those required by the several fast freight lines. Makes classifications of commodities hauled, on forms set forth by the Interstate Commerce Commission, prepares special statistics of tonnage for the various freight traffic officials, and furnishes Western freight agents and others with daily statements of billing covering their various territories. This department has a force of 23 clerks.

ABSTRACT DEPARTMENT.

Conducts the checking and auditing of forwarded and received abstracts, summaries, etc., notifying agents of various changes made in same. This department employs 37 clerks.

REVISION DEPARTMENT.

With a force of 37 clerks revises the waybills, issues corrections, files tissues, etc.

CLAIM DEPARTMENT.

Handles fast freight line over and undercharge accounts, checks various claims for fast freight lines, checks joint and interline claims for the claim agents of the roads members of the clearing house; the one check of the clearing house answering for the several checks under the old system, when the claims were sent from one road to another to be handled by each claim agent, and checked by each freight accountant.

This department handles all final balance sheets of the agents of the roads members of the clearing house, and prepares each day for the Trunk Line Association a report of all eastbound waybills passing the Niagara frontier, this report being accompanied by a copy of each waybill. This work is conducted with a force of 52 clerks.

DAILY EARNINGS DEPARTMENT.

This department compiles for the nine roads in the clearing house statements of daily earnings on all business interchanged, together with earnings on audit-office settlement business, in connection with the several Transcontinental routes, furnishing daily statements to the B. & A. and the B. & M. on audit settlement business. The weekly balances between the roads members of the clearing house are estimated in this department, which consists of 13 clerks.

MAILING DEPARTMENT.

Employs 10 clerks. Collects outgoing and opens incoming mail. Strips interline and fast freight line tissue copies of waybills and distributes same to accounting officials, commercial and fast freight line agents; sorts claims and vouchers, has charge of all matter forwarded and received by express, sorts reports for various other departments, and performs general messenger service for the clearing house.

BINDERY.

This department has one employee, who binds abstract books, volumes of tissue copies of waybills, records of apportionment, as well as sundry volumes of records used in the clearing house.

STATIONERY.

Has two clerks who handle and distribute the supplies of books and stationery, and fill the requisitions of agents for blank forms, etc.

TELEGRAPH.

This department has one operator who handles all telegraphic communications forwarded and received by the clearing house.

The clearing house has a total force of 220 employees, divided as follows: Manager, 1; chief clerk, 1; private secretary, 1; cashier, 1; general bookkeeper, 1; head clerks, 7; stenographers, 7; telegraph operator, 1; binder, 1; stationer, 1; clerks, 198; total, 220.

The total number of clerks employed on what may be termed actual clearing house work is 158. The average clerical salary paid (exclusive of superintendence) is \$44.94 [monthly].

The Central Railway Clearing House has long since passed through the crucial part of its existence, and, notwithstanding a new system of accounting, unfamiliar to agents, as well as to the men in the clearing house, it has been, from accounting, traffic, and other standpoints, a success from the date of its inception. A partial idea of the enormous amount of business done from the date of its organization to the present can be gained from the following statistics, to May 1, 1901 (25 months).

Revenue cleared between membership roads.....	\$33,907,542
Total number of tons, forwarded and received from stations on all roads, divided into 60 commodity classes	9,626,994
Total number of way-bills revised, and filed, in Revision Department	2,860,987
Total number of way-bill copies handled and distributed	14,300,198
Total amount of increased revenue, due to the work of the Revision Department.....	\$164,454
Total number of way-bills abstracted for Trunk Line Commissioners, on traffic moving east-bound from the Niagara Frontier, showing number, date, station from and to, and weight in pounds; extended and footed.....	1,532,986

Total number of claims received from all sources, and checked.....	\$114,264
Total number of letters written.....	129,878
Total number of telegrams forwarded and received	31,500
Total number of pieces of mail handled.....	1,467,466
Total mileage of road in Clearing House territory	11,257
Total number stations reporting to the Clearing House	2,241
Total number agents' requisitions for supplies, filled by Stationery Department.....	14,508
Total number of books bound, in Binding Department, 17,680; viz.:	
Abstract books	13,521
Volumes of tissue way-bills.....	1,898
Records of apportionment.....	676
Sundry volumes	1,586

Monthly meetings for consultation in regard to details are held in the office of the manager, and are attended by the auditors or freight accountants of the roads members of the clearing house.

The clearing house is a progressive step in railway accounting. It is a move in the direction of economy, and when more through billing is established and more roads admitted, and when a universal system of freight accounting is adopted by the auditors of the roads, still greater success will be assured. As an argument for the adoption of a uniform system of freight accounting, the clearing house has already come to have an important influence. Prior to its establishment agents were obliged to report all waybills forwarded and received on each road in the territory now covered by the clearing house. By the clearing house method a daily forwarded and received report now takes the place of the six or eight formerly used.

One of the most prominent traffic officials of the United States has written as follows:

"It is our experience that no arrangement of accounting between connecting roads is so satisfactory and produces such good results as that of through billing with audit settlement. The work of the clearing house in that connection has been marvelous. It simplifies accounts, increases our traffic, disposes quickly and correctly of many errors in billing, cements and brings together in closer relation the various roads with each other, and, in fact, is one of the great modern improvements for the settlement of interchange traffic. Certainly no more correct, simple or beneficial method can be adopted for promoting interchange business, as well as simplifying the auditing thereof."

The clearing house is not an institution, strictly speaking; but is merely a branch of the auditing departments of the individual railways represented in its membership, the manager being subject more or less to the instructions of the chief accounting officials of each road in interest.

Railway Signaling Club.

A regular meeting of this club was held at Chicago on Tuesday evening, May 14. President C. C. Rosenberg (L. V.) in the chair. The first business was a paper by Mr. Wileman (L. S. & M. S.) describing an indicator for use on automatic signals when they are out of order, which was given in the *Railroad Gazette* last week. Replying to questions, Mr. Wileman said that the blade which he uses as a temporary signal on disks out of service is painted purple, and the glass is purple. The regular lamp of the signal is taken out of its socket and placed behind the purple light of the temporary arm. Being challenged to justify the use of a signal of this kind and to show wherein its use is better than to leave the signal (at night) standing red, Mr. Wileman said that its main value was to obviate the necessity of stopping heavy trains. Purple is used because the signal is not a stop signal, and is not classed with ordinary caution signals. To the objection that the red light ought to be retained, as being the most effective warning to an approaching engineer, Mr. Wileman said that the absence of the red light should be a sufficient notice to the engineer until he should come near enough to see the purple light.

Mr. Denny (C. & N. W.)—Could not the repairman usually repair his signals as soon as he could get the temporary arm and put it on?

Mr. Hovey (Taylor Signal Company).—The Chicago & North Western uses a shield to cover the number of a signal when it is out of order. There is a shield in every signal case. At night the engineer finds a red light, but before he comes to a full stop he probably sees by the headlight that the number is covered, and thus he avoids a stop.

Mr. Sperry (Union S. & S. Co.)—I understand that on the Lake Shore a train encountering a signal out of order must stop three minutes. Perhaps that makes this device more useful than it would be on other roads where the stop is shorter, or is not required.

Mr. Rosenberg.—On the Lehigh Valley we do not use bulletins for signals out of service unless they are to be out for several days. We put up with the stops rather than let engineers know that a signal is to be out of order for a considerable time. They will neglect to carefully feel their way through the block if they know that the signal is out of order. By issuing no bulletins we stimulate the repairman to get over the ground quickly so as to reduce the number of stops which otherwise will be recorded against him. We probably do have more stops than some other roads would have under similar conditions, but we have very little trouble, and I think we make the engineers run more carefully. Where a block section is out of order for a long time we take off the head of the signal and do away with it entirely for the time being. The rail circuit will be connected

to the next rail circuit in the rear if practicable. In the case of the renewal of a bridge the tracks will be gauntleted and manual blocking be put in for that section.

There is a disadvantage in putting up a notice that a signal is out of order, in that repairmen will be too ready to let a defect wait over night before they attend to it. We had a case recently where it took 24 hours to find a broken underground wire, and every train was stopped at the signal during that time. The reason it took so long to find the trouble was the frequency of the trains; we could not get a clear block.

Mr. Hovey.—The Chicago & North Western would not put up with having all trains stop at a signal in that way.

Mr. Rhoads (C., C. & St. L.).—If we take action approving a device like Mr. Wileman's we shall scare off railroads which are just thinking of introducing automatic block signals; they will conclude that such signals give a great deal of trouble, and therefore will not use them. One reason why the Big Four has hesitated is that neighboring roads have had trouble with automatic signals.

Mr. Wileman, replying to questions, explained that one reason why a temporary signal was needed on his road was that the automatic signals are scattered and the maintainer has a large territory to attend to.

Mr. Poor (Weber Rail Joint Company).—On some roads any signal or rule to bring trains to a stop would be intolerable. For instance, on the Illinois Central, out of Chicago, in the evening, a slight delay at a signal would hold up trains in every block for a long distance.

Mr. Salmon (Taylor Signal Company).—Perhaps this question ought not to be decided wholesale; conditions may require settling the question with reference to each signal by itself. In some places that I know of I would use the indicator, while in others I wouldn't.

Mr. Denny.—This device is only for banner signals; what would you do with a semaphore?

Mr. Salmon.—I am not prepared to say what I would do; but certainly would use something. I have known the signals for 20 blocks to be disarranged at one time. This condition affects all kinds of automatic signals.

A Member.—Depending on the absence of a signal for a danger signal is mighty dangerous, for engineers will not keep their bearings. You say you will take the chance of having the engineman seasonably locate himself, but you really take a chance that he will not locate himself at all.

On motion of Mr. Sperry it was resolved, by a vote of nine to three, that "It is not desirable to use out-of-order indicators except under peculiar conditions where great delays to traffic might ensue unless some indication is given."

The discussion was then closed and the meeting listened to the paper by Mr. Shaver (U. P.) on "Track Circuits," a report of which was given in the *Railroad Gazette* last week. The discussion on this paper was short. Mr. Rosenberg said that he used a 4-ohm relay with good results. The ballast on his road is stone, slag and gravel. Most of the trouble from escape of current occurs where the ballast is slag. Mr. Dunham (I. C.) uses 4-ohm relays; has very little trouble with rock ballast, but has some where the ballast is earth. Mr. Poor, replying to questions about fiber insulations, said that where the current leaked through fiber joints it was due to lack of care and of proper maintenance. Mr. Morrison (C., M. & St. P.) has found that fiber joints insulate better when covered with black oil.

Mr. Salmon spoke in confirmation of Mr. Shaver's statement that railroads, in asking for bids for automatic signals, do not specify the lengths of the track circuits as they should. No length being specified, rival bidders calculate to make the sections as long as they possibly can, and this causes trouble. The sharpest bidder will estimate differently from other bidders, and thus the prices of the competing firms cannot be fairly compared. The railroad should prescribe the lengths of the track circuits, then all bidders would figure on an equal basis.

Mr. Wilson (Hall Signal Company), replying to a question suggested in Mr. Shaver's paper about adjusting the resistance of track relays to the conditions of the circuit in which they work, agreed with Mr. Shaver that if each relay were made to suit the particular circuit where it is used, better results would be secured; but practically this would be out of the question. Every relay would have to be made to order. As the result of long experience and many tests we now have a standard relay, and the best that we can do is to change the windings on this relay when it is found that the conditions make it necessary.

Mr. Salmon, replying to a question, said that the minimum output from a gravity battery should be not less than one ampere. A battery set up with Lake Michigan water, zinc, copper and blue vitriol should discharge from 0.8 to 1.2.

The Secretary announced that the annual meeting would be held in Buffalo Oct. 8 and 9, and that the headquarters would probably be at the Sadler Hotel, near the Pan-American Exposition grounds. A circular will soon be issued.

On the morning of Tuesday the club visited the West Chicago electric interlocking plants at the crossing of the Chicago & North Western and the Elgin, Joliet & Eastern. At this point there are two crossings and two towers, the apparatus being the all-electric system of the

Taylor Signal Company. Current for both interlockings is supplied from one generating plant.

In the afternoon the club visited the works of the Adams & Westlake Company, after which the members took a drive through the parks.

A Locomotive Wreck.

The engraving shows the most complete wreck of locomotives that we have ever seen. It was a case of a butting collision which took place last January. Two freight



A Fairly Thorough Job.

trains, each hauled by two engines, came together, and it is said that both trains were "running at full speed." Just what full speed was we cannot say. Thirteen cars were wrecked and pretty much everything was burned. Two engineers, one fireman and two tramps were killed and three trainmen were injured. It is not necessary to attempt to ascertain what railroad this accident occurred on, but we will assume that it was on the Trans-Siberian and that the figure in the foreground is Prince Hilkoft.

The Isthmian Canals.

April 26, page 279, we printed an article on the volcanic conditions on the line of Nicaragua Canal, being extracts from some lectures recently delivered by Mr. Bunau-Varilla. The circumstances under which those lectures were delivered, as well as the qualifications of Mr. Bunau-Varilla for discussing this subject, were mentioned in the introduction to that article. Further extracts from the lectures follow, discussing various elements which must be considered in deciding on the relative merits of the Nicaragua and Panama routes.

According to figures given by the Isthmian Canal Commission, the total length of canal navigation [in the Nicaragua Canal], under the plans they adopted, will be 120.53 miles, to which are to be added 66 miles that will be made in free deep water, either in river or in lake, making a total of 186.53 miles from ocean to ocean. Of that total length of 120.53 miles of canal navigation, 22.19 miles will belong to an artificial channel dug below the bottom of Nicaragua Lake, and 27.96 miles to an artificial channel dug through sand and silt below the bed of the upper San Juan River, of which the larger part will be more than 16 feet below the natural level of the bed of that great river, which carries in flood 100,000 cu. ft. of water per second, half given by the lake itself and the other half by lateral tributaries. Outside of the channels opened below the water, 67.33 miles will be dug through open ground, the harbor approaches forming the balance of the total length. The 66 miles of deep-water navigation are formed by 48.74 miles in Lake Nicaragua, and 17.26 miles in the San Juan, immediately above the dam.

Let us now examine the situation in the Panama Isthmus as it will result by the project adopted by the Isthmian Canal Commission. In Panama we find but 38 miles of canal navigation, to which must be added seven miles deep-water navigation through the artificial lake formed above Bohio, by the dam projected there across the Chagres at a distance of 15 miles from the Atlantic Ocean. In fact, the canal navigation in Panama will be less than one-third that of the Nicaragua route.

Depths of Great Cuts.—The continental divide is in Panama, 330 feet above the level of the oceans, and 274 feet above the bottom of the cut projected by the Isthmian Canal Commission; those measurements applying to the natural and original state of the ground. This is the Culebra cut. The work executed by the old and new Panama Company leaves to-day 110 feet excavation to be made above said bottom. Let us now see what aspect the question of deep cuts on the Nicaragua Isthmus presents. On the Nicaragua route, we find that the continental divide is not the place where the deepest cut is necessary. As already stated, the cut at the continental divide is insignificant (44 feet above the lake), but a high

cut of 297 feet above bottom and others of 218 and 170 are to be met in the low valley of the San Juan to go through high ridges projecting in said valley. These facts show that the Nicaragua location is, from the point of view of depth of cuts, the worse of the two routes, and that the ratio of 1 to 3 in favor of Panama is to be found equally for length of canal navigation and depth of cuts.

Dams.—The Isthmian Canal Commission stated that the dam to be built in Panama can be built of earth as well as of masonry, and the same commission, speaking of the Boca San Carlos dam, on the Nicaragua route, said that "the most difficult engineering work in connection with the Nicaragua Canal project is the construc-

tion of a dam across the San Juan River to hold back the waters of the lake, and enable its level to be regulated." This dam would necessitate compressed air foundations to a depth of 100 feet below low-water level of the river, and have a total height of 150 feet from the crest to the foundation. The Commission estimates that eight years would be necessary for its construction. The dam to be constructed at Bohio (Panama) does away with the Chagres. The Commission has proposed to build a dam in order to form a lake whose normal level would be at 85 feet above the sea. The outlet of that lake will be 2,000 ft. wide, and the surface of the lake combined with the dimensions of the outlet are such that the largest floods ever known will be incapable of raising the surface of the lake more than a little over 5 ft. We have seen to what the Culebra difficulty, which was a great and real one, is to-day reduced; we have also seen to what the Chagres difficulty, which was never a real one, has been reduced. Culebra and Chagres are the two names that symbolize in public sentiment the impossibilities of a passage through the Panama Isthmus. Both of them must be totally erased and disappear from the public mind.

Locks.—In reference to the locks, it will be sufficient for me to state that nine locks will be necessary in Nicaragua and only five in Panama, and that the level to which the ships will have to be lifted will be, in the case of the Nicaragua route, 110 feet at maximum, and, under equal conditions at Panama, 90 feet. The foundation of all locks in Panama will be on rock, and only five in Nicaragua will enjoy such advantages; the other four, says the Commission, "are located on foundations that are believed to be safe."

Wind.—The winds in the Nicaragua Canal location are exceptionally violent and permanent. This is the result of the geographical situation of the San Juan valley, open to the trade winds and parallel to their general direction. The lateral high mountains of Nicaragua and Costa Rica form a barrier to the continuous trade winds, which is only open through the San Juan depression. Those continuous gales, much heavier than trade winds at sea, will be a great obstacle for navigators. In Panama nothing of the sort is to be feared, as the canal is in a direction from northwest to southeast, perpendicular to the trade winds. Lateral mountains shelter absolutely the canal from any access of trade winds.

Currents.—It will be easily understood that, the San Juan River having a larger watershed than the Chagres, and the Nicaragua Isthmus being more rainy (from 2 to 2½ times more than the Isthmus of Panama), the quantity of water, though its flow is regulated by the Nicaragua Lake, will be greater, and generate more permanent and intense currents than will be the case in Panama, where the great floods of the river are of short duration, and do not occur at more frequent intervals than three years or more. From measurements taken during ten consecutive years at Gamboa, at the beginning of the five miles where the Chagres and the canal will be in the same location, the average discharge of the Chagres has been 3,400 cu. ft. a second, and the average discharge during the last six months of every year has been 4,800 cubic feet a second. Measurements taken in 1898 in the San Juan River show that the average mean discharge above the mouth of the San Carlos has been 25,000 cubic feet a second for the whole year, and 31,400 for the last six months. It must be borne in mind that

the rainfall at the Atlantic terminus of the Nicaragua Canal at Greytown in 1898 was only 201.64 inches, while the other figures given in the Nicaragua Commission's report are 296.64 inches for 1890, 214.27 inches for 1891, 291.20 inches for 1892, these being the only years when the rainfall was reported for Greytown. It shows that the figures above given for river discharges in Nicaragua are more like a minimum than anything else, and that probably half more may be often expected. In the same comparatively dry year of 1898, the average of the maximum discharge of the San Juan measured in every one of the last six months of the year was 45,500 cubic feet a second, the highest maximum discharge for that period being 70,500 cubic feet a second, in November. (Measurements above mouth of San Carlos.)

In the Chagres in the last twenty-one years five great exceptional floods have taken place, which lasted only a few hours and gave at Gamboa a discharge of 72,000 cubic feet a second in 1879, 58,000 cubic feet a second in 1885, 58,000 cubic feet a second in 1888, 58,000 cubic feet a second in 1890, and 42,000 in 1893.

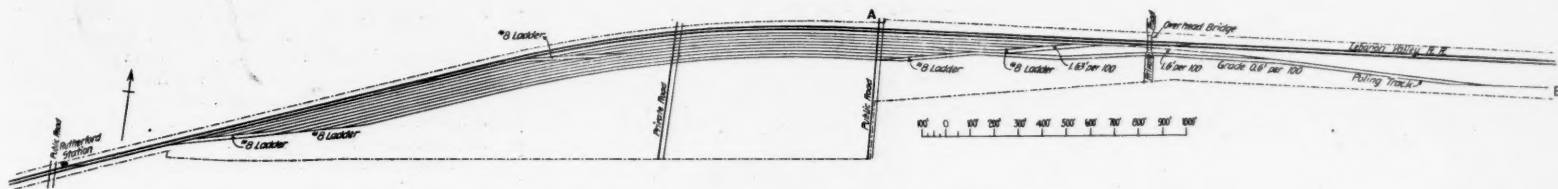
Maintenance of the Channel.—The effect of flow on the maintenance of the canal channel in the bed of the San Juan is difficult to calculate. There is not a part of the technical science where man feels more the weakness of human knowledge than in such a question. The form

rejection due to the reflection of the currents of air on the mountains, make this interior sea always agitated. Its violent storms are quite characteristic and well known.

Conclusion.—The Panama route, having no winds, no currents (except on rare occasions), no sharp curves, no sediments, no bad harbors, no volcanoes, enjoys to the highest degree the three essential qualities totally wanting for the Nicaragua solution—continuity of operation, security of transit, stability of structure. Outside of that it is three times shorter, will cost much less than the Nicaragua route, and is easily transformable into a Bosphorus, the only form that will definitely answer to the world-wide interests to be served by the route, and allow of a passage from ocean to ocean in five hours.

Rutherford Yard—Philadelphia & Reading.

Several months ago the Philadelphia & Reading began some changes in the yard east of Rutherford Station, on the Lebanon Valley Railroad, about three miles east of Harrisburg. The yard, as it is proposed to build it when completed, is shown in the engraving, which gives center lines of tracks only. At the point A is the summit of the yard. The main tracks descend from there eastward. The poling track is at some elevation above the main track at the point B to facilitate shifting and sorting



The Rutherford Yard of the Philadelphia & Reading.

of the bed of a big river is the resultant of the very complicated mechanism of different factors associated together. When the industry of man makes it necessary to change the natural form of the bed, and to transform it into a new channel, this channel is in contradiction with the natural needs of the river, and one may expect to sustain with nature one of the most dangerous struggles, one of those where man has been often totally defeated.

Curves.—To examine this very important subject of curvature, the most essential of all for safe navigation, we have not yet the definite plan of the Isthmian Canal Commission, for the Nicaragua Canal, but as this commission has adopted in its essential lines the Nicaragua Canal Commission's project, and as curvature is commanded nearly absolutely by the natural disposition of the ground, one may take, as a fair approximation, the curvature of the Nicaragua Canal Commission's route as the one that will be more or less presented by the definite project. Leaving aside the curves in harbors, or at the entrance of the locks, where the ships have a very reduced velocity, we find that the Panama route has 23 curves of a totalized length of 19.5 miles, and that the Nicaragua route has 82 curves of a totalized length of 53.5 miles. All the curves of the Panama Canal are of 10,000 feet radius or more, with the exception of three, which have 8,200 feet radius. There are, on the contrary, 69 curves in the Nicaragua Canal below 8,000 feet, of which 50 are between 3,000 and 4,000 feet radius.

But it is not only the number of curves and their radii which has to be considered, but also whether they are located in places where water will be still or not. In Panama there are only three curves of 10,000 feet radius where the canal and the Chagres will be in the same location, that is to say, where eventually currents may take place. In Nicaragua we find 58 curves, having a total extension of 37 miles, where the canal will be located in the San Juan River itself, and of those 58 curves, 43 are between 3,000 and 4,000 feet radius, and have a total extension of 26 miles. It must be borne in mind, that in that part of the canal there will be nearly 28 miles excavated into the bottom of the river to a depth of 16 feet for the larger part. The maintenance of that channel opened into silt and sand seems (from my personal point of view) to be extremely difficult, and will necessitate constant dredging in a river carrying in floods 100,000 cubic feet of water, that is to say, one-quarter of the amount in the Niagara Falls. It is obvious that ships will meet there an accumulation of extreme difficulties, sharp curves, heavy river currents, constant heavy gales and impediments either from the dredges themselves, or from the sand and silt they will have to remove.

Harbors.—With regard to harbors, the advantage, as every one admits, is with Panama, both of whose terminals have excellent harbors. The Nicaragua Atlantic terminal is very bad. The immense quantity of sand thrown into the sea by the San Juan, whose mouth lies south of Greytown, is maintained in suspension by the continuous agitation due to the constant easterly trade winds, and brought into Greytown by a continuous northern stream of sand. The Greytown harbor, which, fifty years ago, was a good one, is now virtually closed by the constant accretion of the sand, and the maintenance of the entrance to the canal there would be very difficult. The Nicaragua route, outside of its ocean harbors, has two others in the Lake of Nicaragua. This lake is a real sea, about as large as the sea of Marmora. The violent gales that continually blow over it, with sudden changes of di-

rection due to the reflection of the currents of air on the mountains, make this interior sea always agitated. Its violent storms are quite characteristic and well known.

The Late Sir Edward Watkin.

A week or two ago (April 19, p. 275) we published in the personal column a short note on the life of Sir Edward Watkin, who died in England April 14. Below is a further account taken from a recent issue of the *Economist* (London). It will be noticed that no mention is made of Sir Edward's relations to the Erie. In 1875 he entered those stormy waters as Chairman of the London Committee of Erie Bond and Shareholders. He came to the United States and made a careful examination of the properties and made arrangements for representation of the interests in his charge, with the Receiver. Among other things the counsel of his committee was to co-operate with the counsel of the Receiver, and ultimately he formulated a plan for reorganization.

The death, in his eighty-second year, of Sir Edward Watkin, Bart., removes from the railroad world one of its most striking and forcible characters. Down to 1894 he had been for over forty years a leading character on the railroad stage. Probably no other man in this country had made his influence felt so widely in connection with railway enterprises, and, certainly, no one surpassed him in the boldness of his schemes, or in the perseverance with which he sought to carry them to completion in spite of many difficulties. He was always most intimately associated with the Great Central Company. He became manager of that company very early in life, was for thirty years its chairman, and the extension of that system to London was the chief work to which he devoted the last years of his active business life. But the South-Eastern also knew him as its chairman from 1866 to 1894, and he continued a director until the end of last year. In 1872 he became chairman of the Metropolitan also, and as the presiding genius of these three important lines he was best known to the present generation, though his numerous activities spread to many other enterprises from time to time.

In 1845 he became secretary of the Trent Valley Railway. This concern became part of the London and North-Western system and Mr. Watkin went over to that company. Passing thence he became manager of the Sheffield Company, and in 1864 its chairman. Almost from the start the policy of Sir Edward was one of extension, and in spite of all difficulties the great dream of his life, namely, the construction of the extension of that company to London, was completed in March, 1890. He lived to see the completion of that great scheme, but it did not fulfil his expectations from a financial point of view. Indeed, so far as the interests of the shareholders were concerned, the London line has been a disastrous failure. Instead of helping the original undertaking to attain an adequate dividend-paying level, as its chairman predicted, it has only dragged the whole undertaking into misfortune. Sir Edward's forecast was that, with the London line completed, the Great Central would pay handsome dividends, instead of merely nominal distributions on its ordinary stock. Instead of that, the last vestige of ordinary dividends has disappeared, and a host of preference dividends as well, and a depreciation of alarming proportions has taken place in all the stocks of the company. Thus, Sir Edward's extension policy as applied to the Great Central has proved a failure.

In his control of the South-Eastern, also, a policy of extension was pursued on lines which have been hardly less injurious to the interests of the shareholders. Whilst the South-Eastern and Chatham have come to terms since Sir

Edward's retirement, the first step made by the Working Union has been to take in hand costly widenings of the South-Eastern approaches to its London terminus. It may also be remarked that the South-Eastern had to accept a much smaller share of the joint net profits of the Working Union than it could have claimed with some prospect of success fifteen or twenty years ago, and less than it would have received had the negotiations of 1890 been successful.

From a financial point of view Sir Edward Watkin's administration was unsound, and in no case was it a real success. Besides the extravagant extension policy to which we have referred, Sir Edward appears to have always shown a preference for hostile relations with neighboring companies. One of his first acts as manager of the Sheffield was to terminate an agreement with the North-Western, which gave the former company a partial guarantee. In 1877 a fusion proposal with the Great Northern fell through, and a similar fate befell the Chatham and South-Eastern negotiations.

Sir Edward Watkin, unfortunately, always seemed to prefer the picturesque to the practical, and thus whilst he did not encourage friendly relations with his neighbors, he built castles in the air in relation to a through route, which should comprise the Sheffield, Metropolitan, East London, South-Eastern, and even the Channel Tunnel, all of which concerns he presided over. A similar showy scheme was that embraced in a traffic union, formed in 1889, of nineteen companies, with the view of improving the connections be-

tween Wales and the North of England. Part of that scheme embraced the Dee Bridge, but though the physical connection is complete, it is, for all practical purposes, a dead letter. Expensive and unproductive extensions and continual strife with neighbors, led to a far from conservative policy in the payment of dividends. The rolling stock and permanent way had to suffer, and charges to revenue of "Watkin" companies for "upkeep" of the system were far from liberal; so that the shareholders are now feeling the effects of such a dangerous policy.

The late Sir Edward Watkin's preference for schemes which appealed to the imagination is further shown by his connection with the Channel Tunnel, the Watkin Tower, and the Kent Coalfields. He is also supposed to have entertained the idea of a ship canal through Ireland, and a tunnel from Scotland to the North of Ireland. With his Parliamentary and literary activities we have not space to deal, but they served to show the remarkable energy and versatility of the man.

A Train De Luxe for Rhodesia.

A magnificent train has been built for the Lancashire Railway Carriage & Wagon Company for the Rhodesian Railway Company, specially arranged for the first-class passenger traffic of Rhodesia, and to carry the mails from Cape Town to Bulawayo. The train consists of six cars, viz., a combined brake, postal and baggage van, a dining car with kitchen, three day and sleeping cars, and a buffet, smoking and library car. The total length of the six cars is 338 ft. Each is mounted on four-wheeled bogies of the most modern construction, the framing of which is a combination of Moulmein teak and steel. The main bearing springs are quadruplicate elliptics, and the equalizing bar springs triple coils. The wheels and axles are practically of the standard pattern used upon the Cape railroads with wrought-iron hydraulically-forged centers and steel tires and axles. The axle boxes are of the most approved type, and constructed for oil lubrication. The main frames of the cars are of steel throughout, and the bodies are constructed of Moulmein teak, with balconies, and are connected by flexible vestibules and central buffers and coupling arrangement.

A feature of the train is the dining car, which has a commodious kitchen, with a full-sized range, and adjacent to it a pantry fitted with cupboards and drawers for the storing of the table linen, cutlery, glass and earthenware. There are also cellars for wine, formed in the floor of the car, and a meat safe on the balcony. The dining saloon has tables and chairs to accommodate 24 passengers. The three sleeping and day cars are alike; each contains four double compartments and one single compartment, all entered by sliding doors from a corridor which passes along the length of the car. Each double compartment has seating accommodation for six passengers, and the single compartments for three passengers, giving a total of 27 passengers per car. The backs of the seats are arranged upon a new patented system to form upper sleeping berths, while the seats themselves form the lower berths. The space under the seats is utilized for stowing away the bed linen in the daytime. Sleeping accommodation is afforded for 18 passengers in each car, and when used as day cars movable tables are available. In addition to the lavatories there is a conveniently fitted bath room in each car. The buffet and library car has a smoking compartment and a card room, and a library compartment in which are a bookcase, a writing desk and large lounges and armchairs.—*Transport.*



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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

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Cast Iron Wheels Under 50-Ton Cars.

It is pretty generally known that many chilled cast iron wheels running under 50-ton cars have broken the last year. The number of such failures and their character have caused grave doubt of the fitness of the chilled cast iron wheel to endure such service. So far as we can learn, however, the phenomenon has been almost local. The railroad companies of which we have inquired which use 50-ton cars have practically all said that they have had no failures of chilled wheels under these cars or "have had no unfavorable experience with the wheels under our heavy cars" or "have had no flange breakages under 50-ton cars," or some similar expression. It may perhaps turn out that these wheel failures are due to some local cause, but that seems hardly likely.

The breakages, have, as we understand, generally begun in the throat and gradually run from the face through the chill, and finally the flange splits off, often in a long piece.

It is a plausible theory that the same cracks appear sooner or later, and in greater or less degree, in lighter service, but that the wheels get scrapped for other causes before the cracks have so developed as to bring about broken flanges. In other words, all chilled cast iron wheels are prone to this congenital weakness, but heretofore few of them have led a life arduous and exacting enough to bring it out. While this theory is plausible we are reluctant to think that it is sound. To find that the chilled wheel has reached the top of its usefulness under a 40-ton car would be little less than a calamity; for if this is true we must stop using cast iron wheels for 40 tons, and shall probably find that it is safest to begin to stop at 30 tons. Further, if this is true we shall find that the chilled wheel is too unreliable to use under passenger cars. But the general use of the cast iron wheel has been one of the elements that has made our vast railroad system possible. It is common knowledge that if construction and equipment had cost us as much as in the old countries we could not have had so much construction and equipment; we could not have found the money for it. For example, if steel wheels were used to-day wherever cast iron wheels are used, the investment would be easily 350 million dollars more than it is now, or a sum sufficient to build and equip about 6,000 miles of average American railroad. Or, to put it in another way, if the railroads of the United States had cost as much as the railroads of Great Britain, their total debt to-day would be 48,000 million dollars, instead of being about 12,000 million. It is not necessary, however, to dwell upon this side of the question. Everybody will agree that at present prices we cannot afford to use steel tired wheels in freight service unless it may be in certain very limited kinds of freight service.

For a dozen years at least the *Railroad Gazette* has held the ground that the cast iron wheel is adequate even for passenger service, which means that a good cast iron wheel can be made safe, using the word "safe" with the necessary practical limitations. Obviously, we should be sorry to be obliged to abandon that ground now and shall not do so without convincing evidence.

The wheel makers have agreed in saying, for eight or ten years at least, that they are not making for general service as good a wheel as they could make, but only as good a wheel as they can get paid for, and perhaps a little better. They still say to a man, so far as we know, that they stand ready to furnish chilled cast iron wheels for service under 50-ton cars if they can get the necessary price (naturally much below the price of a steel wheel), and if they are allowed to say what shall be put in the wheel and how it shall be made. They agree that a wheel made largely of scrap, that has been melted more times than anyone can tell, and that is sold for the price of sash weights, cannot stand under a 50-ton car; but they also agree that such a wheel does not represent the highest state of the art of the wheel founder. We suppose that every railroad officer of much experience will say that these propositions are fundamentally sound.

Beyond this the cast iron wheel makers (some of them at least) do not believe that any steel-tired, built-up wheel can be furnished for a price that the railroads can afford to pay for freight car wheels. This seems probable, and it is not yet demonstrated that a cast steel wheel can be made to do the 50-ton service and produced at a price such that it will be practicable to put it into that service. The "fused" wheel is offered as still another possible substitute for cast iron wheels, but that is yet experimental.

Finally, the cast iron wheel men say that for various reasons the steel-tired wheel will not be so durable or so safe as a cast iron wheel for heavy freight service. The reasons we shall not stop now to develop; that will be done in a later issue; it is enough now to say that this question is largely one of flange wear.

We need not follow this subject further just now, having stated some of the fundamentals, in the hope that those who have opinion and knowledge on the subject may give us more light. We shall come back to this interesting and important subject later, but meanwhile leave it with the reader.

One further suggestion may well be mentioned. It is proposed that six-wheeled trucks shall be used under these very heavy cars. Perhaps that may be one outcome, but we doubt it. The greater first cost and greater cost of maintenance, the additional weight and greater journal friction and rolling friction are all objections. Fifty-ton cars are loaded frequently with 120,000 lbs. We have authentic record of one loaded with ore to 177,000 lbs., but that need not enter into our argument now. A load of 120,000 lbs. in a 38,000 lb. car means 19,750 lbs. on a wheel. There are still a good many locomotives that carry less on each driver, and it would be rash to say that a chilled cast iron wheel can stand such service for many years of life, but we should suppose that the question would be tried out to a demonstration before six-wheeled trucks are used for freight cars.

Meanwhile, some extensive and valuable trials will be made. One road has arranged to equip 200 50-ton cars with various wheels and run them under comparable conditions and under observation. The "fused" wheel, a solid cast steel wheel and at least one make of steel-tired, built-up wheel will be used in the lot, and of course they will be compared with cast iron wheels. It is not to be supposed that the results will be known very soon; that can only happen in the case of a speedy failure; but the experiment will be of vast interest and will help to settle one of the most important questions that has arisen in the last half dozen years.

Traffic Results on the Vienna Elevated Railroad.

The Vienna City Railroad may be compared to the New York or Chicago elevated system, but is more a suburban system, Vienna suburbs being close to the city. This railroad in 1900 carried 28 millions of passengers, against 19 millions in 1899. As part of the road was not opened till the middle of 1899, the rate of growth of traffic is shown better by a comparison of the last halves of the years. The number of passengers in the six months ending with December was 14,348,679 in 1900, against 13,106,187 in 1899, an increase of 9½ per cent. The greatest number of passengers carried in one day so far has been 292,000, July 15, 1900. The gross earnings last year amounted to about \$940,000, and were some \$30,000 less than the working expenses. In 1899 the expenses exceeded the earnings by about \$105,000.

The fares on these railroads have been heretofore charged for three "zones," as follows, for the two classes respectively (second and third, there is no first class): First zone, 3 kilometers (1½ miles) or less; second zone, more than 3 kilometers up to 8 (5 miles); third zone, more than 5 miles. Now for the first zone the fares were about 50 per cent. lower than the street car fares for short distances, and one of the results has been that on Sundays and holidays, when in fine weather all Vienna goes to its beautiful suburbs, the lines have been choked with traffic, a large part of it the short distance traffic taken from street railroads, which is particularly undesirable because it causes so much getting on and off crowded cars, and consequent delay and discomfort.

The railroad authorities have now adopted a new tariff, which, on Sundays and holidays, substantially abolishes all zones and gives uniform fares for all distances, which will be those of the old second zone, namely, 4 cents third class and 6 cents second class. This is a large advance for the short distance travel; but a large decrease for the old third zone (over 5 miles), where the fares have been 6 cents third class and 9 cents second. This third zone is now to be included with the second, with the above second zone fares, on all days; the low fares for the first zone (1½ miles or less) will be preserved on work days.

The regular passengers on this railroad travel chiefly on monthly season tickets, and a great reduction has been made in these, namely, for the first zone from \$1.52 to 91 cents for the second class and from \$1.01 to 61 cents for the third class; second zone (now including the third), from \$2.03 to \$1.22 for the third class and from \$3.05 to \$1.83 for the second. These monthly tickets, however, are not good on Sundays and holidays now, as they were under the old tariff.

The single rate for all distances, almost universal in this country on street and other city railroads, has the great advantage, especially when trains are crowded, of simplifying the selling and collection of tickets; but on very long routes it certainly often works unfairly. In each case the circumstances must decide on which side the disadvantage is greatest. On a system no longer than that of the Vienna City Railroad, with a tremendous pressure of traffic on many days, the uniform fare seems to have much to recommend it; but doubtless unless that fare were extremely low this railroad would lose most of its short distance traffic to the surface railroads, which in reality accommodate it better, and in Vienna, as in most Continental cities, have fares which vary with the distance, and for short distances are very low.

Railroads and Telephone Rates.

The question of telephone rates is always of interest to the railroads, but it is especially so now that the Bell Telephone Company has suffered a crushing defeat in the Federal Courts in its action brought to sustain the validity of the Berliner patent. This Berliner patent purported to cover all "battery" transmitters, and as all the independent manufacturers now make such transmitters, the sustaining of the patent would have resulted in the renewal of the Bell monopoly for several years more.

Most of the railroads use independent telephones in one way or another, and the rate situation would no doubt have been much more interesting had all these been decided by the court to be infringements of the Bell Company's rights; but it is interesting enough as it is, now that it is clearly shown that the choice is quite free as between Bell and independent instruments, and that any difference of rate must be based on difference of service, without any legal shadow to scare the prudent.

The rate question can perhaps be best appreciated if the various kinds of telephone service be classified. This is especially important because with the railroads there are certain kinds of service that are not used by private concerns or even by smaller corporations. Generally the railroads are in position to provide themselves with wires along their rights of way on their own telegraph poles at a much lower rate than telephone companies can provide such wires. For a long time the Bell Companies fought against the tendency of the railroads to help themselves to telephone wires, and refused to admit that there was any difference in the service that should be recognized in the rates. There used to be cases where the same charge was made for telephones in the offices which were constantly used in communication with the public, and for telephones in freight yards connected by railroad wires and used almost exclusively in railroad work. But in the last few years the Bell Companies have shown a more liberal spirit, and now that they have lost their case in the courts we may assume that they will be even more liberal.

Telephone service may be roughly divided into two classes.

First, service that must go through the telephone companies' exchanges; and,

Second, service that does not necessarily do so.

In providing the first kind of service the telephone companies usually provide the telephone instruments and the wires connecting these instruments with the telephone company's exchange, and also the exchange service, which includes not only an expensive switching plant but the operation of the switches; and, furthermore, the lines reaching destination. As this first class of telephone service is open to any one who subscribes for a telephone exchange connection it may be called public telephone service.

For the second kind it is not unusual for the telephone company to furnish telephones on rental; in many cases the telephone company has supplied wires and in some cases switchboards as well, although the operation of the switchboard has been left with the subscriber. It is, however, quite usual for the railroads to supply the major portion of the wires in such arrangements, and as they do not require any connections with or through the telephone companies' exchange, the charge for service should be much less than for public service. This may not seem evident at first, but it must be considered that the maintenance and operation of central exchanges is far the most expensive part of telephone work, and that private telephone systems should not be taxed to help maintain these public exchanges.

Under recent developments the Bell Telephone Companies have allowed a connection between private switchboards leased from them and their own centrals, thus connecting the two kinds of service, public and private. This phase we shall discuss later.

Frequently the railroads have not felt able to pay the high rentals demanded by the telephone companies for private telephone service, and have supplied their need for private telephone service by purchasing "independent" instruments and connecting them with their own wires. It was not so long ago that the Bell Companies charged as annual rental for one set of private line instruments a larger sum than similar independent instruments cost outright, while for a private switchboard with instruments attached, an annual rental was charged that would pay for the plant twice over, and these charges covered instruments alone. The subscriber (the railroad) was at the expense of providing and maintaining the wires and batteries, and also of operating the plant. These rates did not cover any connections with the public, and the whole system was jealously isolated; if a connection with the public was desired a higher charge was made. The excuse for these high charges was the Berliner patent, which is now, we may hope, dead forever. Under the circumstances it is not strange that the railroads have taken the risk and installed many telephones of independent make on private lines and in connection with private exchanges.

Almost all these independent systems have been local. In some cases there have been railroad private lines 20 or 30 miles long, but they have been exceptional. The railroad telephone lines connected with independent switchboards are seldom over five miles long, and most of them less than a mile long.

We thus may find on one railroad many small isolated telephone systems which cannot connect with each other or with the public, excepting when arrangements are made with local independent companies for an interchange of business. The Bell Companies have strenuously refused to connect with such isolated independent plants and the plants have thus been cut off from the Bell long distance lines. These small isolated systems have not been connected with each other by railroad wires to any considerable extent for several reasons.

These reasons are:

First, that long telephone circuits are very expensive; their cost even to a railroad company owning its own poles may be reckoned as nearly a hundred dollars a mile, and there are few railroads that will pay \$10,000 to put up a telephone line over a hundred-mile division, even if it will save the interest in long distance bills.

Second, even if the railroad has the money few railroad telegraph men have the skill to build long distance lines, and the telephone companies have been chary of helping them. It requires a great deal of skill and patience to so "balance" and "transpose" a long distance telephone circuit on telegraph poles as to make it "quiet."

Third, with these practical difficulties in the way the legal difficulty was more regarded than its merits would now seem to warrant.

There is one case where one of the larger railroads has connected two of its own independent exchanges, a considerable distance apart, by its own wires, but this case appears to be unique. This isolation of the private telephone service of railroads from their public telephone service results in an unnecessary duplication of telephones at important points while other points almost as important are left without any. It is common to find in one office, or even on one table, two telephones, one connected with the public exchange and another connected with a private line. In such cases it will probably be found that it is cheaper to buy the private line instruments outright than to rent from the telephone company the switching device necessary to allow the use of one telephone on two lines. It is not unusual indeed to find three telephones where one could do the business.

Of late years, as already intimated, the Bell Companies have shown a disposition to recede from their old stand, and by reducing rates, by applying a "measured service" basis, and by allowing the railroad companies to use their own wires under certain restrictions, they have made it practicable to connect public and private service if a railroad is willing to use Bell instruments exclusively. Under such arrangements the Bell Companies have retained the ownership of all the material except certain wires, making separate charges for the use of the switchboards and the instruments. To this has been added a mileage charge on the wire when furnished. These charges have covered the private service only; when connections with the public has been desired a toll has been charged. Where this system has been introduced it has resulted in a much freer use of Bell telephones by the railroads. The rates, however, and especially the toll charged for communicating with the public, have been

kept at such a point that at many points it is cheaper to subscribe for a flat rate unlimited instrument than to pay toll, and thus even under the improved system of rates there are still points equipped with two or more telephones where one would answer. In general, however, this system is thoroughly modern and convenient. Every one who needs a telephone has one on his desk, and by the use of the proper switching devices this telephone can be used, free, over the private telephone system of the railroad company or, for a toll, to connect with the outside public.

It seems rather curious that the independent companies have not attempted in any large way to compete with this system which has been worked out by the Bell Companies and the railroad companies. The "measured service" feature is an essential part of the system and the independent companies are pretty solidly ranged against the measured service. The independent companies do not lease instruments largely for private service. They will sell you an instrument or tell you where to go to get one, but they will not in general allow you to connect your private instruments into their public systems. Possibly they do not understand that it is essential to a busy railroad man to have one instrument on his desk which must be available to all destinations. Possibly the independents' weakness in long distance service has something to do with it—or their weakness in large cities. This latter can hardly be the case, however, as in one of the cities where the independents are strongest, the Bell Company has recently succeeded in working out a measured service scheme in the way outlined above, which unites the private and public telephone service of the leading railroads.

In general we may say that the Bell interests are in control of the cities and the independents are in control of the country. The Bell has an unrivaled long distance service, while the independents have a few so-called long distance lines in the Middle West. The independents claim that they have a few more instruments than the Bell, but the income from one Bell instrument in New York is ten times the income of a rural independent instrument. The Bell interests are linked together by the management of the parent company, the Long Distance Company, while the independents have only an association. The independents, we may assume, will do pretty much anything the railroads want; the Bell interests have already found out what the railroads want.

It will be seen from this comparison that the Bell Companies still have a vast advantage over their rivals in railroad business although through the loss of their Berliner suit they have lost all semblance of a monopoly on telephone instruments. This advantage ought to be worth something to them, but it cannot be pushed too far. If the Bell Companies should insist on keeping their rates at a point unduly high, it is quite conceivable that the railroads, by making common cause with their neighboring independent telephone companies, might manage to build up an independent telephone system sufficient for their needs. The railroad telegraph poles could help the independents to long distance circuits at a minimum expense, and with the backing of the railroads the independents could succeed in many cities where they have heretofore failed. All the principal railroad shippers would patronize the independent telephone.

It is on the whole to be hoped that the Bell Companies will appreciate the situation and will make such rates that a state of affairs like this will not be forced. In case, through the help of the railroads, the independent telephone movement were to become a formidable antagonist, it would seem that the railroads would gain the most and the Bell interests lose the most. The railroads would gain from the low rates which they would secure and the Bell interest would lose not only from the low rates that the competition would force but from an actual loss of business. They would not only lose the business of the railroads, but the business of people who can have but one telephone and must have the one that reaches the railroad. It would really seem worth while for the Bell interests to give the railroads telephone service at cost, but this, of course, the railroads do not expect. They only ask that on railroad business the telephone companies be satisfied with the same profit that the railroads make when they sell transportation to the telephone companies.

The new Railroad Commission of Kansas has made an order requiring the railroad companies to direct their station agents to keep in a book especially used for that purpose a record of all applications for freight cars, the book to be open for the inspection of shippers, their agents or attorneys. This record must show the name of applicant, the date of application, the kind of car wanted and for what purpose, when car is furnished, capacity of car, number and initials. This order is made on account of complaints that the railroads have discriminated in favor of large shippers. A record of this kind will tend, no doubt, to prevent little injustices from carelessness, whether the railroads have or have not intentionally favored large shippers more than was right, and it will help in a much more important matter, viz., to reveal the stupidity and indolence of local agents. But the new Commissioners are not confining themselves to securing a proper use of the cars now in service; they have advised the railroads to buy more cars if they need more. To convey this advice the Commissioners wrote a letter of 440 words. Most railroad men will regard this letter as at least 10 times too long (and some will say that 437 words could well have been

omitted) so we shall not take the space to print it; but as a sample of what appears to be a new style in official documents of the kind, we quote a few clauses:

From observation, as well as the many flattering reports that reach us from all portions of the wheat growing sections of our state, we believe that we are justified in anticipating one of the largest wheat crops in the history of the state. . . . In view of these facts, together with the many evidences of prosperity among our farmers and stockmen, as well as the increased activity in our large and constantly growing mining and manufacturing industries, . . . we desire at this time to call your attention to this matter, and to submit a few suggestions concerning the same. . . . This board trusts that you have fully recognized your responsibility as common carriers and will be prepared to meet all reasonable requirements . . . and hopes it may be called upon to exercise the authority conferred upon it to enforce the law. . . . The Commission desires the hearty co-operation of your company in all efforts for the promotion of the interests of the people. . . .

In Germany, on occasions of time-table conventions and other meetings of railroad associations of various kinds, there has been a great deal of what we call "junketing," such as, we have heard it intimated, was, in years long past, not unknown at our Master Mechanics' and Master Car Builders' conventions, etc. Now for a long time the German railroads have been chiefly owned by the several governments; their officers receive very modest salaries; their supplies are bought after due advertisement, of the lowest bidder, which lessens the affection of the supply men towards the railroad officers, so that the cost of a glorious good time, with free feasts, carriages, cigars and champagne could not be met very well by any treasury except that of the "royal," "ducal" or what-not "state railroad management." Apparently some of those unreasonable creatures who object to paying taxes for other people's treats have been kicking; for recently the management of the Bavarian State Railroads, in agreement with the Prussian State, the Imperial (Alsace-Lorraine) and most of the other State railroad managements, has sent a circular to the several other railroad managements, with which it has intimate associations, in which it gives notice that it has been instructed by the Bavarian Ministry that the funds of the State may be expended for entertainments on such occasions only in very special cases; and that as it will hereafter be out of its power to treat other railroad men, it must deny itself the pleasure of being treated by them. It even permits itself to intimate that the social side of such occasions has become unduly prominent.

NEW PUBLICATIONS.

City of Providence, R. I.: Annual Report of the City Engineer. Mr. Otis F. Clapp, City Engineer of Providence, sends us his report for the year ending 1900. The annual reports of Providence have long been known among municipal engineers as documents of value because of the volume of data which they contain. The tables of rainfall cover many years and are given in detail; the meteorological tables cover daily and hourly observations; the table of consumption of water cover each month and each year from 1877 to 1900, inclusive. Some information on the destruction of water pipes by electrolysis is given which confirms the knowledge of this subject already accumulated. A description is given of the precipitation plant recently completed by the city, with illustrations.

Index to Engineering News for the Years 1890 to 1899, Inclusive. Compiled by Mary E. Miller, Librarian, Equitable Life Assurance Society. Octavo, cloth, 324 pages. New York: Engineering News Publishing Co. 1900. \$2.50.

The title of this volume is almost all that need be said about it. It is a simple alphabetical index, by subjects, conveniently arranged and in plain print. It is worth while to note that the volumes are referred to by years and not by volume numbers, an excellent departure from common custom, for few people have the remotest notion whether Volume XII. was published in one year or another. The publication of this index is a most commendable enterprise. It can only be profitable to the publishers in an indirect way, but we hope that in such a way it will be profitable.

The Commercial Yearbook; A Statistical Annual of the United States and Foreign Countries, 1901. Edited by Walter A. Dodsworth, Ph. B. Octavo, cloth, 596 pages. Vol. VI. New York: Journal of Commerce and Commercial Bulletin. 1901. \$1.

The Yearbook, published by the *Journal of Commerce*, covers statistics of commerce, industries, agriculture, banking, currency, railroads, shipping, insurance, etc. It is a comprehensive and convenient manual and is provided with an excellent index. The first 164 pages is given to foreign countries, and the rest of the volume is given to the United States, and it would be quite impracticable to undertake to enumerate the subjects covered. We have used this publication for some years and have found it convenient and reliable.

Journal of the Association of Engineering Societies.—The March issue is a pamphlet of 100 pages plus 32 pages of official proceedings, with some inserted plates. The articles are: "A Study in Hydraulics," by Mr. Fenkell; "Submerged Pipe Crossings of the Metropolitan Water Board (Boston)," by Mr. Saville; "Extension of the Group Theory of Atoms and Molecules," by Mr. Skeels; "Engineering Explorations in the Rocky Mountains," by Mr. Blackford.

TECHNICAL.

Manufacturing and Business.

The Bettendorf Axle Co. has appointed Milner & Caleb, Old Colony Building, Chicago, Ill., its general sales agents.

P. F. Brendlinger, Mem. Am. Soc. C. E., has opened an office as consulting engineer and contractor in the Harrison Building, 15th and Market streets, Philadelphia. Mr. Brendlinger has had 30 years of experience as an engineer and contractor, having done a great deal of railroad construction work.

The Kinneer Manufacturing Co., of Columbus, Ohio, has recently made contracts for furnishing and installing Kinneer steel rolling doors in the two new freight stations of the Wisconsin Central at St. Paul and Minneapolis; the Southern Pacific freight house at New Orleans, and the Houston & Texas Central freight station at Dallas, Texas.

The McCord spring dampener has been specified for 34 locomotives for the Chicago, Milwaukee & St. Paul, 35 for the Baltimore & Ohio, 16 for the Chicago & Northwestern, 12 for the Delaware & Hudson, 10 for the Chicago Great Western, contracts for which have recently been let; also 552 stock cars now building for the Northern Pacific.

The American Machinery & Export Co., purchasing agents and exporters, 15 Cortlandt street, New York City, have bought the Cooke Machinery Co., of New York City, and R. H. Richards, for a number of years identified with the latter concern, has been made Vice-President and General Manager of the American Machinery & Export Co.

The Buckeye Malleable Iron & Coupler Company, of Columbus, Ohio, is arranging to build a large steel casting and malleable iron plant to make heavy castings. The Wellman-Seaver Engineering Company, of Cleveland, is getting up plans. The plant will be a large one and of course up to the latest practice. The company has 32 acres of land on which to build. Mr. S. P. Bush will go to the Buckeye Company June 1 as General Manager.

The Standard Acetylene Lighting Co., Springfield, Mass., has now on exhibition at Chicago a private car equipped with the lighting apparatus of that company. The car is in charge of Mr. A. C. Buell and Mr. C. D. Washburn, and has already been inspected by a large number of railroad men. After being shown in some of the principal railroad cities, the car will be exhibited at the M. C. B. convention, at Saratoga, N. Y., in June.

Iron and Steel.

It is said that Jones & Laughlins, Ltd., will build additions to the South Side plant, and that Julian Kennedy is making plans for mill to make standard size rails.

Bids will probably be wanted in about 60 days by J. O. Arnold, 629 Spencer avenue, Dayton, Ohio, for the rails and rolling stock for the Dayton & Germantown Traction Company.

The story now is that negotiations are about finished to include the Bethlehem Steel Company in the consolidation of the Vickers-Maxim and the Cramp Ship & Engine Building Co.

Bids are wanted, until June 11, by the Adjutant General for Queensland, No. 1 Victoria street, London, S. W., for furnishing 13,400 tons of rails and 958 tons of fish plates for the Queensland Government Railways.

Contracts for machinery are now being made for the plant of the Cramp Ontario Steel Co., now building at Collingwood, Ont. The company will make plates and shapes for ships, structural steel, rails, bars and wire.

John C. Fleming, Manager of the Chicago office of the Carnegie Company, has resigned, and the sales office of the Carnegie and Illinois steel companies will be consolidated, with General Sales Agent Baker, of the latter company, in charge.

Torpedo Boat "Bagley."

The torpedo boat "Bagley" was given an official trial run at sea at Bath, Me., on May 16. Her average time was 29.2 knots. In the last hour she made 30 knots and for a period of five minutes she attained a speed of 30.2. The contract speed is 28 knots.

The Compressed Air Company.

At a meeting of the Directors of the Compressed Air Company of New York Julius E. French was elected a Director, and Willis E. Gray, formerly General Superintendent of the Chicago & Alton Railway Company, was chosen Second Vice-President.

Baldwin Locomotive Works.

We have the best authority for saying that it is not true that negotiations are in progress with the Baldwin Locomotive Works looking to the sale of those works or to their combination with the other locomotive builders. There is no intention of selling, leasing or combining these works, but, on the contrary, the present intention is to continue to operate them precisely as has been done in the past.

Westinghouse Takes the Standard Air Brake.

It was officially announced May 21 that the Westinghouse Air Brake Company has bought the Standard Air Brake Company. This is done, as we understand it, through the Standard Traction Brake Company recently incorporated in New Jersey, of which H. H. Westing-

house, Robert S. Green and E. M. Herr are incorporators. The Standard will probably be used to greater or less extent by the Westinghouse Company for street and trolley car equipment.

New Shops on the New York Central.

Within the present year it is intended to build new shops on the Pennsylvania Division of the New York Central at Oak Grove, a small town near Jersey Shore, Pa. Press reports have exaggerated the importance of this work, and in one instance it was stated that these shops would be the largest of the New York Central system. The intention is to build part of a locomotive shop plant this year, and, when requirements justify it, add to the plant until the shop eventually grows to larger proportions, but in no case is it intended that this shall become the most important shop point of the system.

The Barschall Joint in Hungary.

The Kaschau Oderberger Bahn (282 miles, 4 ft. 8½ in. gage) has, by permission of the Minister of Commerce of Hungary and the Minister of Railways of Austria, adapted the "Stossfangschiene" (Barschall Rail Joint) as standard, and has decided not only to equip new tracks with this joint but to replace the outer angle bars of the entire system with it. This is the logical sequence of the advantages observed in considerable trials, viz., reduction in cost of maintenance, prolonged life of new rails and preservation of rails in use until worn out in entire length. These orders are being filled by the Hungarian rolling mills of the Priv. Oestr. Ung. Staats Eisenbahn Gesellschaft. The Director General of the railroad is Herr de Rutka, Budapest, from whom, no doubt, further information can be had.

THE SCRAP HEAP.

Notes.

P. H. Morrissey, Grandmaster of the Brotherhood of Railway Trainmen, headquarters at Bloomington, Ill., has been re-elected.

In the United States Court at Chicago the Atchison, Topelka & Santa Fe and the Indiana, Illinois & Iowa are being prosecuted on a charge of having kept cattle in cars for 108 hours without feed or water.

The "United Brotherhood of Railway Employees" has been organized on the Pacific Coast, and, according to Mr. Debs, is slowly spreading eastward. When the movement becomes important enough, Mr. Debs expects to give it his assistance.

The local freight agents of the Southern Railway, an organization which includes, we believe, the agents at all towns of 5,000 inhabitants or more, held its annual convention at Charleston, S. C., last week. The President for the ensuing year is Mr. J. H. Garner.

After the end of next month the Chicago, Burlington & Quincy will have no newsboys on its passenger trains, except while the trains are standing at the principal stations; that is to say, the contract by which book, fruit and periodical vendors have traveled with the trains, is to be terminated.

The Veterans' Association of the Pittsburgh Division of the Pennsylvania Railroad held its tenth annual reunion at Altoona, on May 16. Robert Pitcairn, President of the Association, presided. This Association, composed of employees who have worked for the company a certain minimum time (21 years, we believe), now has a large membership, the number present at the reunion being 300.

The Commissioner of Railroads of Michigan has just completed the computation of taxes chargeable against the railroad companies, based on income for the year 1900. This tax becomes due and payable under the law of the state July 1, 1901. The total gross income reported is \$39,607,833, as compared with \$36,752,471 for the previous year. This is the greatest amount ever reported by the railroads of the state for one year. The total tax is \$1,353,549, as compared with \$1,240,745 in 1899, or an increase of \$112,805.

Traffic Notes.

The Wabash has reduced its local fares in Michigan to two cents a mile.

The Tennessee Coal, Iron & Railroad Company has sold to the Mexican Central Railroad 150,000 tons of Alabama coal, to be sent by rail to Pensacola, and thence by vessel to Tampico.

The new law against ticket brokerage in New York is to be tested in the courts at once, suits having been begun against Charles Weil, in New York city, and against another broker in Buffalo.

On the Chicago, Milwaukee & St. Paul season tickets now have the distance between the respective stations printed on the face of the ticket in large figures. This device has been adopted, it is said, to prevent alteration of tickets.

The Philadelphia & Reading has made a reduction in single trip, round trip and 50 trip tickets between Philadelphia and stations on the Chester Branch, extending to Darby Creek, and it is said that the price per trip, when using the 50-trip tickets, is lower than by the competing street car lines.

The Central Passenger Association roads have extended the time limit on excursion tickets to Buffalo. Tickets good for 15 days will be sold at two-thirds fare and for 10 days at half fare plus one dollar. Day coach excursions at one cent a mile will be run once a week, but not from as far west as Chicago.

A press despatch of Tuesday last says that the Wabash has made another reduction of two dollars (the third we believe) in the passenger rates from Kansas City to the Atlantic seaboard. This will bring the rate down pretty near to the fare from Chicago to New York, and thus will form a strong temptation to the scalpers.

Western papers announce a reduction of 2½ cents in the rates on grain from Chicago to New York, to take effect June 15, the new rate to be 15 cents on domestic shipments and 13½ cents on those for export. It is said that this announcement is caused by the fact that most of the shipments now being contracted for are being taken at rates still lower than these.

The Southern Pacific reports that in the period from Feb. 1 to May 5 the number of colonists carried into California by that road was 20,434, about two and a half times as many as in the same period of 1900. This number appears to be based on the number of "colonist" and second-class tickets sold. The Atchison also carried large numbers of passengers to California on colonist tickets.

Brooklyn Extension of the Rapid Transit.

The \$8,000,000 worth of work authorized by the Assembly on May 21 for a Brooklyn extension of the Rapid Transit Railroad begins at about Broadway and Ann street, Manhattan, where the present contract ends. The road will go down Broadway to the Battery, where there will be a loop around Battery Park. It will go under the river by two tubes each 7,200 ft. long, and continue up under Joralemon street, Brooklyn; up Fulton street to Flatbush avenue and on that avenue to Atlantic avenue to a point near the depot of the Long Island Railroad, where the work for the present appropriation ends.

There will be a double deck loop around the City Hall, Brooklyn, for trains operating both from New York and Brooklyn. The total length from Ann street to the Long Island Railroad depot in Brooklyn is about 5¼ to 6 miles.

A Buffalo Hotel.

It is reasonable to assume that all of the people who go to Niagara for technical conventions will not care to sleep there. Indeed, we discover that the New York Central Railroad will carry those in attendance at the convention of the American Society of Civil Engineers free between Niagara Falls and Buffalo. It may not be amiss to call attention to the Niagara Hotel, in Buffalo, which has been thoroughly overhauled, and which occupies a city block on Porter avenue. It is said that President McKinley and Mr. Depew have secured accommodations at this hotel, which ought to be guarantee of its quality.

Technical Schools.

Massachusetts Institute of Technology.—We have a circular describing the summer schools to be held at the Institute of Technology during the months of June and July, 1900, these being supplementary courses. They are private on the part of certain instructors and a fee of \$25 is charged for each course. In chemistry a further deposit of \$20 must be made. These summer courses embrace mathematics, mechanical drawing and descriptive geometry, shop work, English, French and German chemistry, civil engineering, mechanism and mechanical engineering, architecture and biology.

Purdue University.—The Bulletin of Purdue University, issued in March of this year, shows a total enrollment of 1,043 students. The Freshmen class numbers 333 and there are 42 post graduate students. The states and foreign countries represented number 42. The Bulletin describes the material outfit and the courses. There are six special schools, namely, mechanical engineering, civil engineering, electrical engineering, agriculture, science and pharmacy.

University of Wisconsin.—A recent bulletin of this University describes the School of Commerce, which we have mentioned before and which is organized on a large scale. The purpose is to supply facilities for training young men who wish to enter business careers, especially in domestic and foreign commerce and banking or in the consular service. Those who are interested in this kind of education, new in the United States, should send for the bulletin.

Ohio State University.—A catalogue of this University has recently been published. There are six colleges, namely, agriculture and domestic science; arts, philosophy and science; engineering, law, pharmacy, veterinary medicine. The College of Engineering covers architecture as well as civil, electrical, mechanical and mining engineering. The course in industrial arts is designed for those who may wish to take positions in various branches of manufacture as practical managers, superintendents or business men. In other words, it is a kind of practical subdivision of an engineering course. There are certain short courses not leading to a degree, the admission requirements for which are much lower than for the regular collegiate work. The University has a considerable laboratory equipment and much the greater part of its students are in the various engineering courses. The total enrollment is 505. Of these 391 are in civil, electrical, mechanical and mining engineering.

LOCOMOTIVE BUILDING.

The Chicago Great Western is in the market for 20 consolidation engines.

The Copper Range is having one engine built by the Schenectady Locomotive Works.

The St. Louis Southwestern, it is reported, will soon be in the market for locomotives.

The Mexican Coal & Coke Co. is having one engine built by the Baldwin Locomotive Works.

The Lehigh & New England is having two engines built by the Cooke Locomotive & Machine Co.

The Santa Fe, as reported last week, has ordered 40 locomotives from the International Power Co.

The St. Louis & San Francisco officially denies the report that it is in the market for locomotives.

The New York, Ontario & Western is having four engines built by the Cooke Locomotive & Machine Co.

The Macon, Dublin & Savannah, as reported in our issue of May 17, has ordered two locomotives from the Baldwin Locomotive Works.

The Duluth, South Shore & Atlantic is in the market for four consolidation and two switch engines instead of the Mineral Range as reported last week.

The Cincinnati, Hamilton & Dayton has ordered two six-wheel switch engines and five 10-wheel heavy freight engines from the Pittsburg Locomotive Works.

The Richmond, Fredericksburg & Potomac has placed an order with the Richmond Locomotive Works for four 10-wheel locomotives. They will have 19-in. x 26-in. cylinders; 68-in. in diam. driving wheels; 24-ft. 4 in. total wheel base; 13 ft. 6-in. driving wheel base, and will weigh in working order about 140,000 lbs., with 102,000 lbs. on drivers. They will have 62-in. straight-top boilers, working steam pressure 180 lbs.; 267 tubes 2 in. in diam. and 14 ft. 5 in. long; fire-boxes, 96½ in. x 42 in.; tank capacity for water, 4,500 gals.

CAR BUILDING.

The Chesapeake & Ohio has ordered 300 box cars from the Pullman Co.

The Grand Trunk, it is reported, will build 500 cars at its own shops.

The Fort Smith & Western has specifications out for 500 coal cars of 80,000 lbs. capacity.

The Chicago Great Western is having 100 cars built by the American Car & Foundry Co.

The Alabama & Vicksburg is having one coach built by the American Car & Foundry Co.

The Queen & Crescent has ordered two coaches from the American Car & Foundry Co.

The Intercolonial Ry. of Canada is about to place orders for 1,000 cars of 60,000 lbs. capacity.

The Chicago, St. Paul, Minneapolis & Omaha has ordered two coaches from the Pullman Co.

The Wabash has ordered 1,000 box cars and 500 flat cars from the American Car & Foundry Co.

The Toledo, Peoria & Western is having 50 freight cars built by the Mount Vernon Car Mfg. Co.

The Indianapolis & Martinsville Rapid Transit Co. will soon be in the market for some cars.

The New Orleans & North Eastern is having 200 freight cars built by the American Car & Foundry Co.

The Vera Cruz has ordered 10 box cars of 40,000 lbs. capacity from the American Car & Foundry Co.

The St. Louis Refrigerator Car Co. is having 100 cars built by the American Car & Foundry Co., at its St. Louis shops.

The American Car & Foundry Co. has received orders from individual concerns for 13 tank cars and 25 refrigerator cars.

The Chicago Great Western, according to report, has ordered 100 Rodger ballast cars and will probably place additional orders for ballast cars.

The Metropolitan Elevated, Chicago, has ordered 40 coaches from the American Car & Foundry Co. and 10 motor cars from the Jewett Car Co. These are to be exact duplicates of those previously ordered.

The Mason City & Fort Dodge has ordered 100 Rodger standard ballast cars, 34 ft. long and of 80,000 lbs. capacity, equipped with air and vertical hook couplers; also two standard 32 ft. distributing cars with double plows; all for August delivery.

The Butte, Anaconda & Pacific order with the Pressed Steel Car Co., as reported in our issue of May 10, calls for 100 double hopper ore cars of 100,000 lbs. capacity for August delivery. They will measure 29 ft. 6 in. long, 9 ft. 8 in. wide, 8 ft. 9 in. high. The specifications include National hollow brake-beams, Diamond S brake shoes, Westinghouse brakes, Universal brasses, Dowling automatic couplers and Westinghouse friction draft rigging.

The Louisville, Henderson & St. Louis has ordered 25 coal cars of 80,000 lbs. capacity from the American Car & Foundry Co., for June delivery. They will measure 36 ft. long, 8 ft. 6 in. wide, 5 ft. high. The road has also ordered five stock cars of 60,000 lbs. capacity. They will measure 38 ft. long, 8 ft. 10 in. wide, 6 ft. 10 in. high. The specifications for all include American steel bolsters, Monarch brake-beams, Hein couplers, Miner draft rigging and Detroit springs.

BRIDGE BUILDING.

ANDOVER, NEW BRUNSWICK.—The Department of Public Works of the Province wants bids, until June 17, as previously noted, for the highway bridge over the St. John River between Andover and Perth in Victoria County. The bridge will be 1,044 ft. and will have two masonry abutments and four masonry piers. The plans may be seen at the Public Works Department in Fredericton, or at the office of Thomas Lawson, in Andover. A. R. Wetmore is Provincial Engineer, Fredericton, N. B.

ATOKA, KY.—The Fiscal Court is reported to have appointed a committee to secure estimates of the cost of a bridge over Salt River, near Atoka.

BANGOR, ME.—P. H. Coombs, City Engineer, informs us that the contract for the deck plate girder bridge over the Kenduskeag River, at Franklin street, is let to the Abertshaw Construction Co. (April 26, p. 289.)

BELLAIRE, OHIO.—The Secretary of War has approved a recommendation of the Chief of Engineers, U. S. A., for a proposed plan of a railroad bridge over the Ohio between Bellaire and Benwood, W. Va. The main span is to be 700 ft.

BELLEVILLE, ONT.—Bids are being received by Wm. R. Aylsworth, County Clerk, for a steel bridge over the Moira River three miles north of Belleville. It is to be of two spans, 94½ ft. each, with 16-ft. roadway.

BOSTON, MASS.—A bill is before the Board of Aldermen to have the City Engineer make an estimate of the cost of rebuilding the Norfolk street bridge in Dorchester.

BROCKVILLE, ONT.—Plans have been made for the bridge proposed over the Canadian Pacific tracks at Lewis street.

BROWNSTONE, IND.—Bids are wanted for 10 steel bridges, including the masonry, until June 4. The lengths are from 14 to 96 ft. Asbury Manuel, County Auditor.

CATTARAUGUS, N. Y.—We are told that the Buffalo, East Otto & Cattaraugus R. R. will need about 10 bridges on the proposed line, which will be from 15 to 24-ft. spans, and one large bridge 122 ft. long, with trestle approaches from 300 to 500 ft. See Railroad Construction column.

CHARLOTTE, N. C.—Charlotte Township is considering building two or more 60-ft. span bridges and would like to hear from bridge builders regarding such work. Address D. P. Hutchison, North Tryon street.

CHICAGO, ILL.—The Sanitary District Board is advertising for bids to be opened on July 24 for two bascule bridges, one to cost \$175,000 and to be located at Harrison street; the other to cost about \$200,000 and located at State street. The designs are prepared under the Scherzer patents. Bids for substructure and superstructure to be separate.

There will be two steel bridges on the Southern Missouri Ry. (extension of the Illinois Southern Ry.). One bridge will cross the Okaw River in Illinois, and consist of two spans of 200 ft. each and two 60-ft. girders; the other is a steel viaduct over Rough Creek, in Missouri, which will be 110 ft. high and 800 ft. long. C. H. Bosworth, President, 204 Dearborn street, Chicago.

The Roads and Bridges Committee of the County Board will recommend that four steel structures be built to replace bridges as follows: Across the Calumet River near Blue Island, a steel bridge to cost \$11,000; over the

Little Calumet, a steel bridge at 147th street to cost \$18,000; across Poplar Creek near Elgin, a steel bridge to cost \$1,400; across Thorn Creek near Glenwood, steel bridge to cost \$2,500.

CHILLICOTHE, OHIO.—It is stated bids are wanted for a lift bridge over the canal at Main street, to be worked by electric power.

CLEARFIELD, PA.—The Grand Jury has recommended the building of a bridge over the Susquehanna River. The townships benefited will build the foundations.

COLUMBUS, GA.—A committee has been appointed to consider replacing one of the wooden bridges over the Chattahoochee River with a steel structure. Robert L. Johnson, Superintendent of Public Works.

DARTMOUTH, MASS.—An issue of \$30,000 bonds has been voted for the bridge proposed over Padanaram River at Smith's Neck. C. W. Howland, Chairman of the Committee; V. J. Potter, Town Clerk.

DAYTON, OHIO.—About one-half mile of trestle work will be needed on the extension proposed by the Dayton, Lebanon & Cincinnati Ry., recently bought in the interest of the Dayton, Springfield & Urbana Electric Ry.

We are told that the Dayton & Germantown Traction Co. will need five steel bridges, the largest of which will be 150 ft., and that the contract will probably be let in 30 days. J. O. Arnold is President.

DILLON, MONT.—The County Commissioners of Beaverhead County want bids, until June 4, for building a six-span bridge over Big Hole River at Jackson.

DUBLIN, GA.—It is stated that a contract will soon be let for the extension of the Oconee River bridge after the plans made by George H. Crafts & Co., of Atlanta. (April 19, p. 274.)

FAIRPORT, N. Y.—The officers of this town and of Perinton are considering building an arch bridge across Irondequoit Creek, on Rochester road.

FREDERICTON, NEW BRUNSWICK.—Bids are wanted by the Provincial Government for rebuilding the Savoy bridge over East River in Northumberland County; the floating canal bridge in Westmoreland County and the Salmon River bridge at the mouth of the river, in Victoria County.

HUNTINGDON, PA.—The Commissioners of Blair and Huntingdon counties have decided to build a joint bridge 14 ft. wide and 105 ft. long over the Little Juniata River near Shoenberger Station. An engineer from each county will be appointed to make plans and specifications. Bids will then be wanted.

JANESVILLE, WIS.—The Rock County Board of Supervisors has provided for the building of bridges as follows: In the town of Rock, over Bass Creek; in the town of Avon, over Sugar River, and in the town of Fulton, over Rock River.

JOPLIN, MO.—The County Commissioners have made appropriations as follows: \$4,850 for a bridge at Terry's Ford, over Center Creek; \$2,645 for a bridge at Duenway, over Tuckey Creek; \$4,645 for a bridge at Hillsford, over North Fork; and \$2,545 for a bridge over Center Creek at Sarcosie.

KALAMAZOO, MICH.—An appropriation of \$50,000 has been made by the Council for street work and bridges for the current year.

KANSAS CITY, MO.—There will be one 200-ft. steel span and two or three smaller spans, ranging from 60 to 150 ft.; also a small amount of wooden trestle bridges on the line of the Kansas City & St. Joseph Electric R. R. No contracts for bridge building have as yet been let. Plans and specifications will be made by the Osborn Engineering Co., Cleveland, Ohio, and the contracts will be awarded by Perry A. Gibson, President of the railroad company, whose office is in the New York Life Bldg., Kansas City, Mo.

We are informed that Messrs. Waddell & Hedrick, Consulting Engineers of Kansas City, will do the engineering work for the Kansas City, Parkville & St. Joseph Electric Ry.

LANCASTER, PA.—Bids are wanted by the County Commissioners until noon of June 5 for the superstructure of a through steel bridge over Conestoga Creek at the foot of Prince street. It is to consist of two spans, approximately 152 ft. long. David E. Mayer, Commissioner.

LANSING, MICH.—The Commissioner of Railroads of Michigan is considering the plans submitted by the Lansing, St. Johns & St. Louis Electric Ry. for a bridge over the tracks of the Pere Marquette on Center street, in North Lansing.

LATROBE, PA.—The Council has passed an ordinance providing for the elevation of the Pennsylvania R. R. tracks and for building steel bridges at the street crossings.

LOWELL, MASS.—Patrick F. Brady, Superintendent of Streets, estimates the cost of repairing the Pawtucket bridge at \$5,900.

NEW CASTLE, NEW BRUNSWICK.—Plans are being made and bids will soon be wanted for a steel bridge at Mill Cove. Particulars can be had from the Provincial Public Works Department at Fredericton.

NEW YORK, N. Y.—The Governor has signed a bill permitting the New York Central & Hudson River to abolish seven grade crossings in the Bronx. A change of route which is provided for will necessitate a bridge over Spuyten Duyvil Creek at its junction with the Harlem ship canal. The work further includes a relocation of the tracks and the removal of the Kingsbridge station.

The contract for the bridge between Pelham Bay Park and City Island has been let to John O'Rourke, at \$9,074.

Both branches of the Assembly have authorized the Commissioner of Bridges to contract with John Rodgers to complete the bridge over the Harlem River between First and Willis avenues, at \$19,600.

The contract for building the drawbridge over the Mott Haven Canal at 135th street, Borough of Bronx, has been awarded to Augustus Smith, at \$29,360.

NUTLEY, N. J.—The Erie R. R. will build a double arch bridge over Passaic avenue and Third River between Franklin and Nutley stations. The plans have been ready for about a year.

OROVILLE, CAL.—The American Bridge Co. has the contract for the steel bridge over Oroville River at \$9,590.

OTEGO, N. Y.—The wooden bridge over the Susquehanna River at this place is reported unsafe by Engineer S. E. Monroe, of Binghamton, who recommends building a new structure at a cost of \$14,000.

PARRY SOUND, ONT.—A committee has been appointed by the Town Council to get plans for the bridge on Cascade street.

PETERBOROUGH, N. H.—Proposals are wanted, until May 25, for building a two-arch stone bridge at West Peterborough; also for retaining walls at the North Village. Address John W. Robbe, member of the Bridge Committee.

PHILADELPHIA, PA.—The Fairmount Park Commissioners have asked the Council to appropriate \$30,000 to replace the old wooden bridge known as Allen's Lane bridge with a stone arch.

PITTSBURGH, PA.—It is reported that the Pennsylvania Co. contemplates moving the viaduct of seven steel spans at Temperanceville to a new location and replace it with stone arches 13½ ft. higher than the level of the present structure.

RICHMOND, VA.—The Commissioners of the Free Bridge are considering the advisability of repairing the structure.

ROCKVILLE, PA.—Eighteen of the 48 arches on the Pennsylvania's stone bridge over the Susquehanna River at this place are finished. Additional contracts will be let. Contractors Drake & Stratton are doing the work on one side of the river, and H. S. Kerbaugh on the other. The work was described and illustrated in the Railroad Gazette, May 25, 1900, p. 338.

ST. JOSEPH, MICH.—It is reported that a bridge to cost about \$150,000 will be built over the Missouri River by the Chicago, Rock Island & Pacific.

SALAMANCA, N. Y.—Plans and specifications for the work to be done in connection with the elimination of the grade crossings at Main street can be seen at the office of the Chief Engineer of the Erie R. R., New York City, until June 5; also at the company's office in Salamanca. Proposals are wanted on the bridge work, concrete masonry, etc.

SEATTLE, WASH.—The War Department has ordered work stopped on the railroad drawbridge now building across the Duwamish River on the tide flats, stating that it is an obstruction to free navigation. Major John Millis, Corps of Engineers, U. S. A., is in charge of the Puget Sound District.

SIoux FALLS, S. DAK.—The County Commissioners have decided to build seven bridges in various parts of the county varying in length from 16 ft. to 64 ft.

STOCKTON, CAL.—The city is arranging a plan for street improvements which includes new bridges over waterways.

TAMPA, FLA.—The Fortune street and the Lafayette street bridge are considered as unsafe and will probably be rebuilt.

TERRE HAUTE, IND.—The County Commissioners want bids, on June 11, for bridges and arches as follows: Honey Creek, two arches of 25-ft. span and one 16-ft. arch span in Fayette township; Nevins, one bridge, 100-ft. span; Lost Creek, two bridges, 50-ft. span; Riley, two bridges, one 24-ft. span and one 50-ft. span; Linton, one bridge, 35-ft. span and one 50-ft. span; Prairie Creek, one bridge, 24-ft. span, and two 50-ft. spans; Honey Creek, two bridges, one 30-ft. and one 36-ft. spans; Sugar Creek, one wooden bridge over Vandalia railroad track, 108-ft. span; Pierson, two bridges, 30-ft. spans.

VERMILION, OHIO.—The Commissioners of Erie County have granted permission to the Lake Shore Electric Ry. to bridge the Vermilion River at this place. The structure will be 180 ft. long. R. A. Danforth, General Superintendent.

WATERFORD, N. Y.—Bids are wanted, until noon of June 1, for remodeling the four-span 725-ft. Burr truss bridge over the Hudson River between Waterford and Upper Troy for the Union Bridge Co. T. R. Lawson, Chief Engineer. (April 12, p. 257.)

WILLIAMSPORT, PA.—Proposals are wanted, until noon of May 28, for a low truss bridge of one span over Mosquito Creek in Armstrong Township. Harrison Wheeland, Commissioner; T. R. Winder, Clerk.

WILLIMANTIC, CONN.—The New York, New Haven & Hartford and the Central Vermont have agreed to put in bridges over the road which is to connect the Windham and South Windham highways near Camp Station. The matter is before the town officers.

Other Structures.

BALTIMORE, MD.—The Baltimore & Ohio proposes to alter the present shops at Mount Clare at a cost of about \$25,000.

BOSTON, MASS.—The Navy Department has let the contract for the new power house at the Boston Navy Yard to T. G. McCaffery, of Utica, N. Y., at \$42,000. This is the first of the new buildings to be built at this yard.

BUFFALO, N. Y.—Mayor Diehl has appointed a committee to consider the question of a union railroad station for Buffalo. The committee is as follows: R. B. Adam and E. H. Butler, grade crossing commissioners; E. H. Hutchinson, Joseph E. Gavin, Michael Danahy, Charles F. Bishop, G. Fred Zeller, George K. Birge, Frank C. Ferguson and Robert F. Schelling.

DAVENPORT, IOWA.—We are told that the Chicago, Rock Island & Pacific is having plans made for a new passenger depot in Davenport.

MARQUETTE, MICH.—It is reported that the Duluth, South Shore & Atlantic is having plans made for a new passenger station on Front street, between Main and Spring streets.

MOLINE, ILL.—The Chicago, Rock Island & Pacific will build extension to the round house this summer.

MOUNT VERNON, IOWA.—The contract has been let for a passenger station at this place by the Chicago & Northwestern, to be of pressed brick and stone and cost \$15,000.

NEW YORK, N. Y.—See Bridge Building.

OLEAN, N. Y.—Bids are being received for a passenger station for the Erie R. R. in Olean. The plans may be seen at the local office.

PHILADELPHIA, PA.—The Philadelphia & Reading has applied to the Board of Port Wardens for permission to extend its piers in the Delaware River. The company wants to buy Pier 29 at the foot of Noble street and rebuild it.

PITTSBURGH, PA.—Contract for the large central power plant for the Pittsburgh, McKeesport & Connellsville R. R., at Everson, and the seven sub-stations, has been awarded to Westinghouse, Church, Kerr & Co.

The McConway & Torley Co. is building a new foundry at its plant at Forty-eighth street, to make open-hearth castings. The McClintic-Marshall Construction Co. is building the structural steel for the foundry building, which will be 300 ft. long and 85 ft. wide. They have also another contract for the steel work on an addition to be 100 x 75 ft. wide.

POCATELLO, IDAHO.—The Oregon Short Line will build a freight depot in Pocatello.

RACINE, WIS.—The Brown-Corliss Engine Co. has been incorporated, with a capital of \$1,000,000, and will build a large machinery plant near Racine. The incorporators are: Walter F. Brown, Walter G. Whiting and Julius Wechselberg.

SCRANTON, PA.—We are told that the Delaware, Lackawanna & Western is planning to rebuild, in part, the roundhouses at Scranton and at Syracuse. The old houses are not large enough for the new class of locomotives.

SOUTH SHARON, PA.—The Pennsylvania Co. is having plans made for a new station on the Erie & Pittsburgh Division in South Sharon.

WEEHAWKEN, N. J.—The New York Central has contracted with the American Bridge Co. for 8,000 tons of structural material for a grain elevator to be built at Weehawken, the terminus of the West Shore.

WEST SUPERIOR, WIS.—The Northern Pacific, according to report, proposes to build large docks on the Superior Bay front.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page avii.)

Western Railway Club.

The new officers of the Western Railway Club are: President, W. F. M. Goss; First Vice-President, J. F. Deems; Second Vice-President, G. R. Henderson; Treasurer, P. H. Peck; Secretary, J. W. Taylor; Trustees, R. D. Smith and W. H. Marshall; Library Trustees, F. W. Sargent, F. A. Delano and F. H. Clark.

Rocky Mountain Railway Club.

At a meeting of the Rocky Mountain Railway Club, Denver, Col., May 18 a paper was presented by Mr. William Baird, General Car Inspector of the Burlington & Missouri River R. R., entitled "Fence posts from scrap boiler tubes." The following papers, previously read, were discussed: "Railroad statistics and their practical use," by Mr. A. D. Parker, Auditor of the Colorado Southern; "What are the objections to typewritten train orders?" by Mr. C. A. Parker, Superintendent of Telegraph, Denver & Rio Grande.

North-West Railway Club.

The North-West Railway Club held its regular and annual meeting at the Hotel Ryan, St. Paul, May 15, the occasion being marked by a large attendance. The election of officers resulted as follows:

President—Mr. T. A. Foque, Mechanical Superintendent Soo Line.

First Vice-President—Mr. A. Lovell, Superintendent Motive Power, Northern Pacific Railway.

Second Vice-President—J. J. Flather, Professor of Mechanical Engineering, University of Minnesota.

Secretary and Treasurer—Mr. T. W. Flannagan, Chief Clerk, Mechanical Department, Soo Line.

Assistant Secretary—Mr. F. B. Farmer, Westinghouse Air Brake Company.

A paper by Mr. Roland C. Greer, of the Keystone Chemical Manufacturing Company, on "Purification of Water for Use in Locomotive Boilers," was read, followed by a discussion on the subject. There was also an animated discussion on "Pooling of Locomotives," which was continued to the next meeting, which will occur in September.

Engineers' Club of St. Louis.

The 527th meeting was held May 15, President Spencer presiding. Present, 26 members and six visitors. The paper of the evening was entitled, "The Coal Supply of St. Louis and Adjacent Territory," by Mr. Duncan F. Cameron, Superintendent of Mines for Donk Bros. Coal & Coke Company. Mr. Cameron took up in a general way the extent of coal territory tributary to St. Louis, giving areas of these coal measures, also their total annual production and the consumption of bituminous coal by the city of St. Louis. He then discussed in detail what had been done in the way of washing coal at the mines, the result of which is the elimination of the slate and iron pyrites. The construction of a modern coal washing plant was explained and illustrated on the screen. Mr. Cameron stated tests have been made in office building steam plants in St. Louis and at other places showing a saving of 20 per cent. to 28 per cent. of fuel bills by using washed coal instead of unwashed coal. It was also stated that a very fair quality of coke had been made from washed Illinois coal in ovens which were not altogether of modern type. Experiments, the object of which is to produce a good foundry coke from Illinois coal, are being continued with considerable promise of success. The discussion was participated in by Messrs. Bryan, Kincaid, Blaisdell, Philip Moore and others.

National Convention of Railroad Commissioners.

The thirteenth annual convention of Railroad Commissioners will be held at the Palace Hotel, San Francisco, on Tuesday, June 4. The Railroad Commissioners of all states and state officers charged with any duty in the supervision of railroads are invited to attend. The Association of American Railway Accounting Officers and the Street Railway Accounting Association of America are also invited to send delegates to the convention, who may join in the consideration of questions of special interest to their associations.

Committees have been appointed to report on the following subjects:

1. "Classification of Operating and Construction Expenses of Electric Railways."
2. "Grade Crossings."
3. "Railroad Taxes and Plans for Ascertaining Fair Valuation of Railroad Property."
4. "Classification of Construction Expenses."
5. "What Earnings of Interstate Railways Constitute Gross Earnings Within a State That Can Be Justly Assigned as Taxable Where the Tax Is Upon Gross Earnings."
6. "Railroad Statistics."
7. "Legislation."
8. "Safety Appliances."
9. "Delays Attendant Upon Enforcing Order of Railroad Commissions."
10. "Uniform Classification."

The call for the convention is signed by Cicero J. Lindly, of Illinois, Chairman, and Edw. A. Moseley, Secretary Interstate Commerce Commission, Washington, Secretary.

Car Foremen's Association, Chicago.

The regular meeting of the Car Foremen's Association of Chicago was held in Room 209, Masonic Temple, Wednesday evening, May 8. The following subjects were discussed:

A received from B a foreign car with the draft timber broken, old, and one American continuous cross key bent on opposite end of car (no indications of rough usage). The car was taken over A's line to a point about 36 miles distant, where it was offered to C, but refused on account of one draft timber broken, old, and two American cross keys bent. A was obliged to make re-

pairs. Can A make bill against the owner provided he secures joint evidence from B and C showing that the defects existed as stated above? After discussion it was decided that as necessary repairs were not made at the proper time, the road handling the car, or A in this case, should be held responsible for the entire damage.

A car is returned to the owners after having sustained damage to end sill, deadwood and draft timbers requiring their renewal. The coupler, with pocket riveted to same, is missing. All of the items are properly covered by defect card. The question is, what labor charge is proper? Particularly can any charge be made for the expense incurred in assembling the parts of the coupler and putting it together? It was decided that no additional charge should be made for assembling the parts of the coupler and applying it to the car.

In cleaning and oiling triple valves and the application of triple valve gaskets and check valve case gaskets at the same time, what is the proper charge to make? Should a charge of 10 cents for applying a triple valve gasket and 10 cents for a check valve case gasket be made in addition to the charge of 25 cents for cleaning and oiling? What is the common practice? It was decided that no additional charge for labor should be made for renewing gaskets, as no additional labor was involved.

Should not the practice of omitting to make bill or to apply repair card in case of making wrong repairs of owners' defects be discouraged? The general opinion was strongly in the affirmative. It was stated that in some cases the conductors made repairs to cars out on the line where repair cards could not be attached to cars. It was also stated that cards would become lost off, and that the present method of attaching them to cars was not satisfactory, and that some sort of a card case should be applied to each car for the reception of cards. A committee was appointed to make recommendations along these lines.

American Society of Civil Engineers.

The thirty-third annual convention will be held at Niagara Falls, N. Y., June 25, 26, 27 and 28, 1901. The Committee of Arrangements is (of the Board of Direction) C. W. Buchholz, Chairman; Samuel Whinery, Charles Warren Hunt; (Local Committee) W. A. Haven, Chairman; Thomas W. Symons, Samuel J. Fields, Charles W. Bradley, Walter McCulloh. The headquarters of the Society, Secretary's office, meeting room, etc., will be at the International Hotel. The Trunk Line Passenger Committee has, upon application, granted the rate of a fare and one-third, on the certificate plan, for the round trip to and from Niagara Falls. If a party can be made up to go together from New York a special train will leave via the Erie Railroad, foot of Chambers street, New York, at 10 a. m., and foot of West 23d street, New York, at 9:55 a. m., on Monday, June 24, 1901. On this train a special rate of \$10 per capita on individual excursion tickets, New York to Niagara Falls and return, has been arranged; all such tickets will bear the limit of fifteen days, and it is understood that the number of people going on this special train shall be counted as being in attendance at the meeting in the same manner as if they had purchased certificates. This special \$10 rate is only available on this special train.

PROGRAMME.

June 25, 10 a. m.—The President will deliver the annual address. At the close of the President's address the business meeting of the Society will convene, and will take up the proposed amendment to the constitution, the proposed appointment of a Special Committee on Standard Rail Sections, and any other business which may be brought forward. The afternoon will be free for visits to the Pan-American Exposition or to the numerous points of interest in the vicinity.

8:30 p. m.—Walter McCulloh, M. Am. Soc. C. E., will address the Society on "The Bridges of Niagara." The address will be illustrated with lantern slides. On this evening and on every other evening during the convention there will be music and informal dancing.

June 26, 10 a. m.—Meeting for general discussion of all papers which have been presented during the last six months, and of the following topics which have been selected by the Publication Committee:

Topic No. 1.—Do the interests of the profession, and the duty of its members to the public, require that only those who are competent be allowed to practice as Civil Engineers? Under what authority, through what agency, and upon what evidence of competency, should applicants be admitted to the practice of Civil Engineering?

Topic No. 2.—Steel-Concrete Construction:—What stress in tension and compression should be allowed in concrete? What is the proper modulus of elasticity of concrete? In Steel-Concrete Arches: (1) What should be the ratio of steel section to concrete section, and what is the best form and disposition of the former? (2) What consideration should be given to temperature changes and consequent stresses? (3) What are the best proportions for concrete, and what is the best method of placing it?

Topic No. 3.—The Decolorization of Water:—When is it necessary? How may it be accomplished?

Topic No. 4.—The Consumption of Water in Municipal Supplies, and the Restriction of Waste.

Through the courtesy of the New York Central & Hudson River Railroad, S. R. Callaway, President; W. J. Wilgus, Chief Engineer, free transportation will be issued, through the Secretary, to members of the Society and the members of their immediate families, in attendance at the convention, good during the four days of the convention on all trains between Niagara Falls and the Pan-American Exposition.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Maj. Daniel W. Lockwood, Corps of Engineers, U. S. A., has been relieved from duty at St. Paul in charge of River and Harbor work, and ordered to Washington as Engineer Secretary of the Lighthouse Board.

—Sir Courtenay Boyle, K. C. B., Permanent Secretary to the British Board of Trade, died suddenly in London on Sunday last. Sir Courtenay was born in Jamaica in 1845, being the son of Cavendish Spencer Boyle. He entered the Government service in 1868, and was made Assistant Secretary to the Board of Trade in 1885. In 1892 he was made Permanent Secretary. He was created K. C. B. the same year.

—Col. Charles R. Suter, Corps of Engineers, U. S. A., has been relieved from duty at Boston in charge of river and harbor works in that vicinity, and ordered to New York, where he has been assigned to duty as President of the Board of Engineers, President of the Board on New York Harbor Lines and President of the Examining Board. Maj. William S. Stanton has been ordered to relieve Col. Suter at Boston, but will continue also his duty as Engineer of the First and Second Lighthouse Districts.

—Mr. T. Williams, General Superintendent of the Lake Superior Division of the Canadian Pacific Railway, was born in Ireland in 1852. He began his railroad career on the Grand Trunk as station assistant in 1868, and in 1869 was appointed operator. Two years after he became Despatcher. He then held a similar position on the Canadian Pacific, and in 1885 became Chief Despatcher and car distributor. Then in 1887 he became Assistant Superintendent, and in 1896 his title was changed to Superintendent.

—Mr. E. R. McNeill, Resident Engineer of the Great Northern, is a native of Iowa, having been born in Gordon Grove July 25, 1866. He was appointed draughtsman and rodman in 1887 on the Chicago, Kansas & Nebraska (Rock Island), and the following year was leveller with the Missouri River Commission from Kansas City to St. Louis. Then for one year (1889-1890) he was Assistant Engineer on Construction for the Northern Pacific in Montana. From 1894 to 1899 Mr. McNeill was engaged principally upon engineering work relating to mines, mills and smelters. From 1899 to 1901 he was Engineer in charge of construction for the Montana Central.

—At the meeting of the directors of the New York, New Haven & Hartford, on May 11, the first since the funeral of Mr. C. P. Clark, the following vote was adopted: Upon the retirement of Charles P. Clark from the Presidency of this company in 1899, we minuted upon the records our appreciation of his services and expressed our cordial good wishes for his enjoyment of many years of well earned rest. The news of his sudden and untimely death in a foreign land was received with the deepest sorrow and regret by this board. Now that his life is before us as a whole and the sum of his achievements is complete, he needs no further tribute from us. His reputation, rooted in the esteem of the whole community served by the railroad, bears witness to the integrity and the public spirit which characterized the discharge of his almost public duties. The visible result of his efforts—a great railroad system with its terminals, its roadbed, its equipment, its volume of service performed, welcoming comparison with any standard, will long remain a monument to his foresight, his breadth of vision, his perseverance, his courage in meeting and overcoming obstacles, his adroitness in management, his unceasing activity, and his rare promptitude and effectiveness of action. We who were associated with him in the development and execution of his plans cannot add new luster to his name; but it is a satisfaction to recall his unique personality, to record our appreciation of his qualities, and to give expression to that sorrow which attends the close of a life which inspired so much loyalty, respect and enthusiasm.

ELECTIONS AND APPOINTMENTS.

Ann Arbor.—J. J. Kirby, heretofore Assistant General Passenger Agent, has been appointed General Passenger Agent, relieving W. H. Bennett, General Freight and Passenger Agent, to that extent, effective June 1.

Atchison, Topeka & Santa Fe.—Last week we announced the appointment of James Collinson as Assistant Superintendent of Machinery, succeeding Mr. Sanderson. Now it appears that Mr. Player must take another leave of absence on account of ill health and Mr. Collinson will relieve him, with the title of Acting Superintendent of Machinery. G. R. Henderson has been appointed Assistant Superintendent of Machinery, succeeding Mr. Sanderson. Mr. Henderson was Assistant Superintendent of Motive Power and Machinery of the Chicago & Northwestern. C. W. Kouns, heretofore Assistant General Superintendent, has been appointed Superintendent of Transportation, succeeding A. W. Towsley, resigned.

Buffalo, East Otto & Cattaraugus.—The officers of this company, referred to in the Construction column, are: President, H. L. Moench, Boston, Mass.; Vice-President and General Manager, U. L. Upson, Cattaraugus, N. Y.; Secretary, Theo. Truby, Otto, N. Y.; Treasurer, W. A. Oaks, Cattaraugus, N. Y.

Canadian Pacific.—On May 1, the Eastern Division of the C. P. was divided and will be operated as follows: H. B. Spencer, Superintendent at Ottawa, in charge of Hull and Ottawa Terminals, of Chalk River Section, including Chalk River, of Prescott and Brockville branches, of M. & O. section, and the Point Fortune branch. W. J. Singleton, Superintendent at Montreal, in charge of Montreal Terminals, and of Smiths Falls section, including Smiths Falls. The Montreal Terminals are extended to include Adirondack Junction. R. R. Jamieson, Superintendent at Farnham, in charge of lines beyond Adirondack Junction to Newport and Megantic inclusive, and of branch lines connecting therewith; and J. E. A. Robillard, Superintendent at Montreal, in charge of Ottawa section east of Hull and of branch lines connecting therewith, of Quebec section and of branch lines connecting therewith.

G. S. MacKinnon, heretofore Master Mechanic of the Ontario & Quebec Division, has been appointed Master Mechanic of the Western Division, with headquarters at Winnipeg. J. R. Sprague, heretofore Master Mechanic of the Atlantic Division, has succeeded Mr. MacKinnon as Master Mechanic at Toronto Junction, Ont. R. Preston has been appointed Master Mechanic of the Lake Superior Division, with headquarters at North Bay.

Central of Georgia.—R. L. Baugh has been appointed Acting Purchasing Agent, succeeding J. W. Comer, resigned.

Central of New Jersey.—At a meeting, held May 13, J. T. Pritchard was elected Assistant Secretary and Assistant Treasurer.

George O. Waterman, Jr., has been appointed Auditor of Disbursements, succeeding W. W. Stevenson.

Chesapeake & Western.—Andrew Hunter, Jr., has been appointed General Auditor, effective May 20. Thomas W. Hawkins was recently appointed to this position, but owing to his sudden death, on May 5, never assumed the duties.

Chicago & Alton.—J. R. W. Davis has been appointed Engineer Maintenance of Way of the Eastern Division, with headquarters at Bloomington, Ill.

Chicago & Northwestern.—W. H. Whalen, heretofore Master Mechanic at Baraboo, Wis., has been appointed Assistant Division Superintendent, with headquarters at Oshkosh, Wis.

Erie.—C. S. Goldsborough has been appointed Superintendent of the Allegheny Division, with headquarters at Hornellsville, N. Y., succeeding George W. Dowe, resigned to accept service elsewhere. J. C. Tucker succeeds Mr. Goldsborough as Superintendent of the Rochester Division at Rochester, N. Y., effective May 16.

Fort Wayne, Dayton & Cincinnati Traction.—The officers of this company, referred to in the Construction column,

are: President, S. F. George, Dayton, Ohio; First Vice-President, D. W. La Fetra, New York, N. Y.; Second Vice-President, Chas. L. Hyde, Pierre, S. Dak.; Secretary, Chas. W. Gebhart, Dayton, Ohio; Assistant Secretary, C. E. Swayne, Dayton; Representative in New York, D. W. La Fetra, Dun Building.

Great Northern.—The reports that A. H. Hogeland, Resident Engineer, had resigned, are incorrect.

Kansas, Eastern Oklahoma & Texas.—The officers of this company, referred to in the Construction column, are: President, J. H. Brewster, Cherryvale, Kan.; Vice-President, J. A. Burkholder, Jennings, Okla. T.; Secretary, Geo. W. Hall, Stillwater, Okla. T.; Assistant Secretary, Charles Fletcher, Cherryvale, Kan.; Treasurer, George Canfield, Jennings, Okla. T.; General Attorney, J. H. Stanford, Independence, Kan.; General Manager, F. L. Putnam, Cushing, Okla. T.

Lake Erie & Western.—J. B. Thomas has been appointed Superintendent of the Sandusky Division, succeeding S. R. Kramer, resigned. M. P. Deniston becomes Superintendent of the Indianapolis & Michigan City Division, and George Dyer, Superintendent of the Fort Wayne, Cincinnati & Louisville Division, effective May 15.

Lake Shore & Michigan Southern.—H. A. Ziesel has been appointed Superintendent of the Western Division, succeeding A. B. Newell, resigned, to take service with another company, effective May 21.

Louisville & Nashville.—C. Quarrier, Comptroller, with headquarters at Louisville, Ky., has resigned.

Nevada County Narrow Gauge.—C. P. Loughridge will, in addition to his duties as Superintendent, assume those of General Manager.

New Brunswick Coal & Railway.—The officers of this company, referred to in the Construction column, are: President, Ernest Hutchinson, Douglaston; Vice-President, Franklin Stetson, St. John; Secretary, Geo. W. Allen.

New York Central & Hudson River.—S. R. Callaway, President of this company, has resigned to become President of the American Locomotive Company. (See page 347 of this issue.) Angus Brown will take up, on June 1, the duties of Division Superintendent of Motive Power of the N. Y. C. & H. R. He will be stationed at West Albany in charge of the shops at that point. He is now Master Mechanic of the Chicago Terminal Transfer Railroad.

New York, Susquehanna & Western.—George W. Dowe, heretofore Division Superintendent of the Erie, has been appointed Superintendent of the N. Y., S. & W., succeeding H. E. Gilpin.

Northern Michigan.—The officers of this company, recently referred to in the Construction column (May 10, p. 324), are: President, Frank Hamlin; Vice-President and Treasurer, Byron Boyden, both of 107 Dearborn street, Chicago.

St. Johnsbury & Lake Champlain.—George W. Cree has been appointed Assistant Superintendent, with headquarters at St. Johnsbury, Vt., succeeding E. H. Blossom, resigned.

Suffolk & Carolina.—At a meeting of the Directors, held May 13, Charles F. Pitt, Jr., was elected Treasurer, succeeding W. B. Oliver. Mr. Oliver was chosen a Director, succeeding Mr. Pitt.

Tennessee Central.—W. B. Doddridge has been elected Vice-President and General Manager.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ATCHISON, TOPEKA & SANTA FE.—An officer of the Gulf, Colorado & Santa Fe writes that preliminary surveys are made for the proposed extension from Bobbin, Texas, to Montgomery, Cold Spring and Oliphant's, and it is believed that the road will be built in the very near future. (April 19, p. 275.)

AUGUSTA & AIKEN.—This company has been organized in Georgia to build an electric line 15 miles long connecting the cities named. John B. McAfee & Co., of Philadelphia, are reported to have the contract. James U. Jackson, of Augusta, is interested.

BELLEFONTE CENTRAL.—This line is to be extended, according to report, from Pine Grove Mills, Pa., its present western terminus, to Spruce Creek on the main line of the Pennsylvania.

BLUE GRASS TRACTION.—This company was incorporated in Kentucky, May 10, with a capital stock of \$10,000, to build an electric road from Paris to Lexington and Nicholasville, and also to Millersburg and Blue Lick Springs. John T. Hinton, C. E. Rice and R. C. Talbot, Paris, are interested.

BUFFALO, EAST OTTO & CATTARAUGUS.—The route of this proposed electric line is from Hamburg, N. Y., through North Boston, Boston Center, Boston, Morton's Corners, East Otto and Otto to Cattaraugus, about 35 miles. Surveys are nearly completed and contracts will be let in about 30 days. There will be five miles of heavy cuts and fills. Otherwise the work will be easy, the maximum grade not over 3 per cent. There will be about 10 bridges in all, with from 15 to 24 ft. spans, one steel bridge of 120 ft. having trestle approaches from 300 to 500 ft. long. (May 10, p. 323.) The officers are given under Elections and Appointments. (Official.)

BURLINGTON, CEDAR RAPIDS & NORTHERN.—An officer is quoted as saying that this company will build its extension from Albert Lea, Minn., north only so far as Faribault, and will use the Chicago, Milwaukee & St. Paul into St. Paul. (Construction Supplement, March 8, 1901.)

CANADIAN PACIFIC.—Bids have been received for building the Arrowhead & Kootenay extension from Lardo, B. C., to Trout Lake, 32 miles. (Jan. 25, p. 69.)

CANADIAN ROADS.—The Government resolutions for subsidies to new railroads and revotes were brought down on May 14 in the Dominion House of Commons. The amounts are as follows:

From Sunny Brae to Country Harbor, thence to Guysboro, 80 miles, \$225,000.
Quebec & New Brunswick, from Chaudiere Junction, Quebec, towards the present terminus of the St. Francis branch of the Temiscouata Ry., N. B., thence to mouth of St. Francis River, 63 miles, \$201,000.
Montreal & Province Line, Farnham to Frelighsburg, 19 miles, \$60,800.
From Windsor to Upper Musquodoboit, 40 miles, \$128,000.
From Pubnico, N. S., to Port Clyde, 21 miles, \$99,200.
From Chipman Station to Gibson, 45 miles, \$144,000.
Inverness & Richmond, from Point Tupper to Broad Cove and Cheticamp, 98 miles, \$313,000.
Toronto, Lindsay & Pembroke, from the western terminus of the 20 miles subsidized in 1899, west towards Bancroft 20 miles; also for 11 miles to Bancroft from a point 40 miles west of Golden Lake; total, 31 miles, \$99,200.

Schomberg & Aurora, from a point between King and Newmarket to Schomberg, 15 miles, \$48,000.

Ottawa & Gatineau, 20 miles towards Desert, \$64,000.

Restigouche & Western, 20 miles from Campbellton towards Grand Falls, \$64,000.

For a line of 30 miles from Caplan to Passeblec, the subsidy granted in 1899 to be paid in the following manner: (1) To the Hamilton Bridge Works Co. in payment for bridge superstructures, not to exceed \$35,000. (2) For the completion of the roadbed and works incidental thereto. (3) Towards payment of overdue balances pro rata in settlement of claims for labor, etc., in all not to exceed \$96,000.

The new subsidies are as follows:

Manitoulin & North Shore, from a point between Sudbury and Little Current to a junction with the Algoma Central at Goulais River, 130 miles, \$416,000.
From Gandique Ferry, N. S., to Arechit, eight miles, \$25,000.

Central Ontario extension to the Canada Atlantic at Whitney, 20 miles, \$64,000.

Kingston & Pembroke, from Sharbot Lake via Lanark to Carleton Place, 41 miles, \$131,200.

Norwood & Apsley, from Norwood, Ont., to Apsley, 30 miles, \$96,000.

From Wolfville to the Government pier on Morris basin, one mile, \$3,200.

Algoma Central, from the Sault to White River, 135 miles, \$431,000.

From Bridgetown, N. S., to Middleton, 11 miles, \$35,200.

From Burkes Falls, Ont., to Magnetawan River, two miles, \$6,400.

Between Halifax and the Central Ry. of Nova Scotia from the 49th mile from Halifax to junction with Grand Central, 30 miles, \$96,000.

From Bruce Lake to Rock Lake in Algoma, nine miles, \$28,000.

From Roberval, Quebec, towards James Bay, 60 miles, \$192,000.

From point on Canadian Pacific, Stonewall or Selkirk branch, to Icelandic River via Gimli, 35 miles, \$112,000.

Restigouche & Western, extension from 50th mile from Campbellton to effect a junction with its line 22 miles east from St. John River, 33 miles, \$99,000.

Ottawa & Gatineau, unearned balance on 62 miles from Hull towards Desert, granted in 1897, \$35,872.

Divided by provinces the subsidies are as follows:

Ontario	\$1,320,600
Quebec	765,472
New Brunswick	307,600
Nova Scotia	956,800
Manitoba	112,000
Total	\$3,462,472

CAIRO & LAKE HURON.—The Michigan Board of Railroad Crossings has approved the map locating this proposed line from Cairo to Owendale on the Pontiac, Oxford & Northern. Henry B. Joy, of Detroit, is President.

CENTRAL ARKANSAS & EASTERN.—This company was incorporated in Arkansas, May 16, with a capital stock of \$100,000, to build a line in Lonoke County, 15 miles long, from a point on Crooked Bayou. The directors are: J. A. Bowman, W. S. McCain, B. N. Beakley and W. J. Locke.

CHESAPEAKE & WESTERN.—Building is reported in progress on an extension from Bridgewater, Va., west to coal fields. (March 29, p. 229.)

CHICAGO & EASTERN ILLINOIS.—Surveys are reported under way for a branch from Sullivan, Ill., through Litchfield and Dorchester to Findlay.

CHICAGO GREAT WESTERN.—President Stickney makes the following statement with reference to proposed extensions:

We mean to extend at once both to Sioux City and to Omaha. The lines will be built under the charter of the Mason City & Fort Dodge road and will go under that name. The line to Omaha will be practically an air line for a greater part of the distance. Both roads will run out of Fort Dodge as one and then branch off about 10 or 12 miles from the city. We propose to obtain egress from Fort Dodge by the construction of a steel bridge 3,000 ft. long and 120 ft. high at its highest point. The new roads will, as we figure it, give us the short lines to Council Bluffs, St. Paul, Minneapolis and Chicago. From Fort Dodge to Council Bluffs via the Illinois Central is a distance of 137 miles; by our line it will be 131 miles. The Central from Fort Dodge to Chicago is 374 miles; ours will be 300 miles in length. Our line to Minneapolis is 220 miles long, while the M. & St. L. is 223.

CINCINNATI, HAMILTON & DAYTON.—The Decatur & Springfield has been incorporated in Illinois, with a capital stock of \$100,000, to build the Decatur, Indiana & Western extension connecting Decatur, Ill., with Springfield. Practically all the right of way has been obtained. Frank C. Roby is President; Lucien L. Burrows, Vice-President, and John D. Prestley, Secretary, all of Decatur, Ill. (April 26, p. 292.)

CLEVELAND & YOUNGSTOWN.—This road is financed by the Richland & Mahoning interests and is projected from Cleveland, Ohio, to Youngstown. Surveys are in progress, but probably no contracts will be let for building until fall. The officers are connected with the R. & M. (Official.) Charles W. French, of Mansfield, Ohio, is President; C. D. Crouch, Mansfield, Vice-President and General Manager; E. C. Hurd, Akron, Chief Engineer. The central office is Akron. (Youngstown & Cleveland, May 3, p. 308.)

DAYTON & GERMANTOWN TRACTION.—The route for this proposed line, recently entered as the Dayton, Germantown, Hamilton & Cincinnati Electric, is from Dayton, Ohio, through Soldiers Home, Germantown and Madison to Middletown, 25 miles. Surveys are completed and contracts for grading, track laying, bridging, etc., will be let in 30 days. The work is not difficult. The maximum grade is 3 per cent. It is to be built on the most improved plans, with 90-lb. rail, 60 ft. long and first-class equipment. (Official.) J. O. Arnold, 629 Spencer avenue, Dayton, is President; F. B. Douglas is Vice-President, and T. C. Lindsey, Secretary. (May 10, p. 323.)

DES MOINES, IOWA FALLS & NORTHERN.—The Globe Construction Company of Chicago has been awarded the contract for building this line from Des Moines, Iowa, to Iowa Falls, 70 miles. Surveys are completed and most of the right of way obtained. Building is to be begun at once. E. S. Ellsworth, of Iowa Falls, is President. (April 19, p. 275.)

DETROIT & TOLEDO SHORT LINE.—With reference to this line of the Toledo & Monroe Electric, whose incorporation was noted last week (p. 342), J. M. Mulkey, General Manager, makes the following statement:

We now have our arrangements completed for the rapid construction of the road from Monroe to Detroit, that portion of the line between Toledo and Monroe now being in operation. There is only one slight curve in the entire line from Monroe to Detroit, which is in the village of Flat Rock. The road is being built with the best construction possible, with the expectation of making time equal to the steam roads between the two cities. When completed the total mileage from the Russell House in Detroit to the Body House in Toledo will be only 55 miles, four miles shorter than the Michigan Central and 10 miles shorter than the Lake Shore. The road is being built with 70-lb. rails, rock ballast and Westinghouse electrical machinery. The through cars will be 50 ft. long and equipped with four 100 h.p. motors each. The proposed Detroit & Toledo Shore Line will in no way interfere with our road, as it traverses entirely different ter-

ritory, the only competition being between Toledo and Detroit, and in view of the fact that our road is being built for high speed, with no grade crossings, we do not anticipate serious interference with the through business. The right of way has been all secured from Monroe to Detroit, with the exception of a few pieces which the attorneys of the road have had instructions to commence condemnation proceedings against at once. The rails have been bought for some time.

DULUTH, VIRGINIA & RAINY RIVER.—Surveys are in progress, according to report, for this line from Virginia, Minn., north toward Koochiching in the Rainy Lake country. The heaviest grade will not exceed 1 per cent., and this only for a distance of one mile. Contracts will be awarded about June 1. The company will build 50 miles, according to report, this year. The incorporators are connected with the Cook & Turrish Lumber Co., of Duluth. (April 12, p. 259.)

FINDLAY, COLUMBUS GROVE & FORT WAYNE.—This company has been incorporated in Ohio, with a capital stock of \$50,000, to build an electric road from Findlay west to Fort Wayne, Ind. E. E. Miles, President of the First National Bank, Findlay, and Dr. J. A. Kimmell, Findlay, are incorporators.

ENFIELD & LONG MEADOW ELECTRIC.—Tucker, Anthony & Co., bankers, of Boston, Mass., write that they represent a syndicate which is buying this line and the East Windsor Street, and expect to begin work at once to build a through line from the terminus of the Springfield Street Ry. Co.'s tracks to those of the Hartford Street Co. It is proposed to have the road in service by autumn.

FORT SCOTT, IOLA & WESTERN.—Right of way has been asked in Iola, Kan., for this proposed line from Moran, on the Missouri, Kansas & Texas, to run west through Iola to Piqua or Neosho Falls on the same line. J. E. Henderson, of Sedalia, Mo., is interested.

FORT WAYNE, DAYTON & CINCINNATI TRACTION.—The route of this proposed electric line is from Cincinnati, Ohio, northwest 330 miles through Dayton to Fort Wayne, Ind. Surveys were begun last week, and will be continued as rapidly as possible. Building will be begun within the next three months. (May 10, p. 323.) The officers are given under Elections and Appointments. (Official.)

GOLDEN BRIDGE ELECTRIC.—This company was incorporated in New York, May 21, with a capital stock of \$100,000, to build an electric line from North Salem, Westchester County, to Ridgefield, Conn. The directors are: E. B. Brady, of Golden Bridge; F. W. Siebert, of Waterbury, Conn.; William H. J. Howe, of North Salem, and John Brophy, of Ridgefield, Conn.

GREAT NORTHERN.—Negotiations are being conducted for right of way for the Chuckamut cut-off from Fair Haven, Wash., south along the water front to a point near Burlington. The contract is reported let and building is to be begun soon.

Surveys are reported in progress for a branch from Index, Wash., northeast 14 miles up the Skyhomish River and Silver Creek to Mineral. (Construction Supplement, March 8, 1901.)

HAMBURG, RUSTON & SOUTHERN.—Arrangements are reported made for building this line from the Ruston end, which is proposed from Hamburg, Ark., southwest 75 miles to Farmerville, La., to Ruston. Among those interested are: Capt. E. L. Kidd, H. W. Ragan and J. D. Barksdale, of Ruston, La.

HANCOCK & CALUMET.—An officer writes that it is not certain as yet that changes of grade will be made on this line, as reported. (May 10, p. 323.)

ILLINOIS CENTRAL.—The Southern Missouri (Construction Supplement, March 8, 1901), organized to extend the Illinois Southern to the St. Francois County lead fields, has obtained right of way through Ste. Genevieve County, Mo., and has let the contract to McArthur Bros. Co., of Chicago, for grading and masonry through the county, 27 miles. The work is unusually heavy, and will not be completed until early in 1902. The lighter work in St. Francois County will not be let until July or August. (Official.)

ILLINOIS NORTHERN.—This company has been incorporated in Illinois, with a capital stock of \$500,000, to build a railroad in Cook County, from the Chicago, Burlington & Quincy tracks, Hoyle avenue, to connect with the McCormick machine plant. The principal office is Chicago. The incorporators and first Board of Directors are: Rodney B. Swift, F. B. Montgomery, John C. Fetzner, Charles W. Allen and G. A. Ranney, all of Chicago, Ill.

IOWA ROADS.—Surveys are being made for a proposed belt line north of Des Moines, Iowa, planned to connect the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul by a line from Clive to Berwick. Profiles of the preliminary survey will be ready in a week, when estimates of the probable cost of building will be made. (C., M. & St. P., April 26, p. 292.)

KANSAS, EASTERN OKLAHOMA & TEXAS.—Preliminary surveys are made for this line from Cherryvale, Kan., through Bartlesville, Ind. T., Cleveland, Okla. T., and Shawnee to Henrietta, Texas, about 350 miles. At the annual meeting, on May 2, the headquarters were moved from Jennings, Okla. T., to Cherryvale, Kan. The officers are given under Elections and Appointments.

KENTUCKY ROADS.—E. C. Morton, of Madisonville, is interested in a line from his town through a tract of coal lands to Hamby's on the Illinois Central, about 18 miles.

KENTUCKY WESTERN.—The company is reported making arrangements to build, this year, from Dixon, Ky., to Owensboro, about 40 miles.

KINGSTON & PEMROKE.—Building is to be begun at once on the proposed extension from Sharbot Lake to Carleton Place. See Canadian Roads above.

LAKE ERIE, ALLIANCE & WHEELING.—Building was to be begun this week on this proposed line from a point near Alliance, Ohio, to run to Dillonville, Jefferson County, 26 miles. A. W. McDonald & Co., of Pittsburgh, have the contract for the first eight miles. The road is practically an extension of the Alliance & Northern. (March 29, p. 230.)

LAKE SHORE ELECTRIC.—The Everett-Moore Syndicate is reported to have obtained the entire right of way along the lake for the extension of the Cleveland & Lorain Electric from Lorain to Toledo. (March 15, p. 194.)

LARAMIE, HAHN'S PEAK & PACIFIC.—Isaac Van Horn & Co., of Boston, are offering \$500,000 shares of the common stock at \$1 per share, par value \$10. The company is incorporated to build a narrow gauge line from Laramie City southwest 96 miles to the Colorado State line near Baggs, with branches to Saratoga, Wyo., and Hahn's Peak, Colo. Isaac Van Horn, of Laramie, is President. (May 3, p. 307.)

LAUREL-WAYNESBORO.—The Governor of Mississippi has issued a proclamation authorizing the organization of this company to build a line 30 miles long from Laurel, on the New Orleans & Northeastern, east to Waynes-

boro, on the Mobile & Ohio. The incorporators are: W. R. Fagin, C. P. Weathersby, L. West, J. W. Blackledge, R. L. Halsey, M. B. Grant and F. M. Shepherd.

LOUISIANA ROADS.—A. G. Broussard & Co., of New Iberia, write that they are building the line recently referred to which is to run from Plaquemine, on the Texas & Pacific, southwest 37 miles to Iberia on the Southern Pacific. Two miles is graded and building is in progress on three miles more, which will complete the road to Loreauville on the River Teche. (May 10, p. 323.)

MAUCH CHUNK, LEHIGHTON & SLATINGTON.—This company has made a mortgage for \$600,000 in favor of the West End Trust & Safe Deposit Co., of Philadelphia, as trustee, for its proposed trolley line from Mauch Chunk to Lehighton and Perryville to Slatington, 20 miles. I. A. Sweigard, of Philadelphia, is President. (May 17, p. 342.)

METROPOLITAN STREET.—This company proposes to build an electric line about 14 miles long from Birmingham, Ala., connecting Ensley, Avondale and other towns.

METROPOLITAN STREET (NEW YORK).—The Union Ry. Co. has begun building an extension of the trolley line from Mt. Vernon to East Chester, near Pelham Bay, 2½ miles long.

MIDWAY & VERNON.—A charter has been granted to build this line in British Columbia, and a subsidy of \$4,000 per mile given. James Kerr and Robert Wood, of Greenwood, B. C., are owners.

MISSOURI, KANSAS & TEXAS.—Officers of this company have been examining a route for the proposed line from McKinney, Texas, west about 86 miles to Decatur. (Construction Supplement, March 8, 1901.)

MISSOURI PACIFIC.—Surveys are reported completed for the White River Ry. Co.'s line, 20 miles, in Arkansas, from Batesville northwest to the zinc fields in the north part of the State. C. G. Warner, First Vice-President of the M. P., is President. (W. R., Construction Supplement, March 8, 1901.)

MUSQUODOBOIT VALLEY.—Arrangements are made for beginning building this line, and it is expected that the contract will be awarded to M. H. Fitzpatrick. It is controlled by capitalists of Halifax and Montreal.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—Surveys are reported in progress for a branch through Doran's Cove, Ala., to Needmore Cove to tap lands of the Needmore Coal Co.

NEVADA COUNTY TRACTION.—Application has been made for franchises in Grass Valley, Cal., for this proposed line in Nevada County, from Nevada City to Grass Valley, five miles. John Martin, 324 Pine street, San Francisco, is President. (April 26, p. 292.)

NEW BRUNSWICK COAL & RAILWAY.—Arrangements are made for beginning survey for this line in New Brunswick from Grand Lake east to Gibson, York County, on the Canada Eastern. The officers are given under Elections and Appointments. (Construction Supplement, March 8, 1901.)

NEW YORK CENTRAL & HUDSON RIVER.—Governor Odell has signed the bill authorizing the abolishing of grades at Kings Bridge, New York City, and a cut-off along the north bank of the Harlem Canal. This will save about three-fourths of a mile and require a bridge across Spuyten Duyvil Creek and a culvert across the old bed of the Harlem River. Seven grade crossings will be eliminated. (Construction Supplement, March 8, 1901.)

NORTHERN PACIFIC.—The County Commissioners have granted right of way from Bismarck, N. Dak., to the military post, Fort Abraham Lincoln, for a spur about one mile long. (Construction Supplement, March 8, 1901.)

Building is reported in progress on the Oberon branch from Oberon, N. Dak. (March 15, p. 194.)

PENNSYLVANIA.—Bids are invited, until May 28, for the proposed tunnel, with approaches, under the main line tracks near Fortieth street, Philadelphia.

PITTSBURGH, CINCINNATI, CHICAGO & ST. LOUIS.—A branch three miles long will be built this year, according to report, from Duff's Station, Pa., to connect with the Pittsburgh, Fort Wayne & Chicago, at the Ohio connecting bridge.

PORTLAND, NEHALEM & TILLAMOOK.—The officers have filed a report with the directors outlining the proposed building of this line this year from Portland, Ore., west 93 miles along the Nehalem River to Nehalem, with a branch 20 miles long to Grand Rapids and Central Nehalem. The company proposes to build 43 miles this year and will issue \$650,000 of 5 per cent. first mortgage bonds. John McCracken is President, and George T. Myers, Vice-President, both of Portland, Ore. (Construction Supplement, March 8, 1901.)

RIVERSIDE & HARLEM.—The company has obtained a franchise from the village of Harlem, Ill., for its proposed line at Chicago between the stations of the Illinois Central and the Wisconsin Central, 12 miles long. W. G. Bruen and John C. Welling, connected with the Illinois Central at Chicago, are incorporators. (April 19, p. 276.)

RUTLAND.—Surveys are reported begun for a line to be owned by the company from Iversville to run north to Montreal. The company has obtained control of the Montreal bridge to run across the St. Lawrence to Longueuil. The Dominion Government will be asked to grant subsidies for \$500,000.

ST. LOUIS & SAN FRANCISCO.—Building is in progress on the first 10 miles of the extension from Sherman, Texas, south toward El Paso. (March 22, p. 210.)

SAGINAW SOUTHERN.—Surveys are made and arrangements completed, according to report, for building this electric line from Saginaw, Mich., south via St. Charles, Chesaning, Owosso and Lansing to Jackson, paralleling the Lansing, Jackson & Saginaw line of the Michigan Central. Clark Ring, of Saginaw, Mich., is President and General Manager. (Construction Supplement, March 8, 1901.)

SEATTLE-TACOMA INTERURBAN.—This company has been incorporated in Washington, with a capital stock of \$2,000,000, of which \$500,000 is 6 per cent. non-cumulative preferred, to build the proposed electric line from Seattle, Wash., to Tacoma, 37 miles. Kidder, Peabody & Co., of Boston, are interested. The company will issue \$1,350,000 of 5 per cent. 30-year gold bonds, dated Feb. 1, 1901. These are subject to call at any time at 110 and accrued interest. The road is to be built with 70-lb. T-rail and equipped for high speed passenger service as well as for freight and express business. Jacob Furth

will probably be president. (Seattle & Tacoma Electric, Construction Supplement, March 8, 1901.)

SHAWNEE, RED FORK & COALGATE.—This company was incorporated in Oklahoma, May 9, with a capital stock of \$300,000, to build a railroad from Red Fork, Ind. T., to Shawnee and Tecumseh, Okla. T. The incorporators are: Freeman A. Short, of Chicago; J. W. Hockaday, of Stroud, Okla. T.; S. D. David and George Boeck, of Tulsa, Ind. T.; George S. Green, of Guthrie, Okla. T., and E. and D. F. Smith, of Cashion, Okla. T.

SHORE LINE.—This road, running from St. Stephen, on the Nova Scotia border, to St. John, N. B., 82½ miles, and controlled by Russell Sage, is to be rebuilt and extended into St. John city either by the old bridge at the Falls or by a new bridge at Navy Island, to connect with the Washington County.

SOUTH CAROLINA ROADS.—The Atlantic Coast Lumber Company, which was reported some time ago making surveys for a line from Georgetown north to Marion, is reported from a point across the river from Georgetown to Pawley's Island, a seashore resort, 16 miles. (Construction Supplement, March 8, 1901.)

SOUTHERN.—Surveys are in progress, according to report, for a connecting line from Clinton, Tenn., south about 35 miles to Loudon on the main line.

Surveys are completed for the extension from Burgin, Ky., southeast about 119 miles via Lancaster to Jellico. (Construction Supplement, March 8, 1901.)

SOUTHERN OHIO TRACTION.—Charters have been obtained in Ohio for two new branches for this company's electric line, the Hamilton, Oxford & Western, to extend from Hamilton, via Oxford, to College Corner, and thence into Indiana; the Cincinnati, Venice & Western to run from Cincinnati north through Hamilton and Butler counties.

SOUTHERN PACIFIC.—Surveys are reported in progress for a line around the southern end of the Great Salt Lake, from Salt Lake City running through or near Grantsville, Utah.

SOUTH HAVEN & LAKE SHORE.—This company has been incorporated, in Michigan, with a capital stock of \$176,000, to build a line from South Haven north along Lake Michigan about 22 miles to Saugatuck. The principal office is at South Haven. The Board of Directors may determine the motive power. The directors are: C. J. Monroe, M. H. Bixby, W. S. Bradley, J. S. Malbone, L. S. Monroe, D. D. Tourtellette, A. C. Runyan, D. M. Gerber and E. E. Brunson.

SUBURBAN TRACTION.—This company was incorporated in Ohio, May 14, with a capital stock of \$50,000, to build an electric road from Cincinnati east about 30 miles to Bethel. The incorporators are: George R. Scrugham, C. H. Davis, J. M. Kennedy, G. W. Mallon, Ellis G. Kinkead and J. M. Hutton.

TAMPA BAY & EAST COAST.—This company has been organized under the Florida law to build from Tampa to Bartow, 45 miles, with branches. R. H. Rhett, of Charleston, S. C., is President; B. H. Heyward, Atlanta, Ga., Vice-President, and L. W. Haskell, of Savannah, is Secretary.

TENNESSEE CENTRAL.—The Tennessee Construction Co., of Nashville, writes that Callahan, McDowell & Co., of Knoxville, Tenn., have been awarded the contract for grading, trestle, masonry, etc., for building the line from Lebanon, Tenn., to Nashville, and also for grading the Nashville terminals. (April 26, p. 292.)

VELASCO TERMINAL.—This property, whose foreclosure was noted last week (p. 342), is to be extended from Chango Junction, Texas, to Rosenberg, connecting with the Missouri, Kansas & Texas and the Southern Pacific, providing right of way and terminal facilities at the mouth of the Brazos River can be obtained.

WADLEY & MOUNT VERNON.—The people of Douglass, Ga., are asking this company to build an extension from that point to the Ocmulgee River. It is proposed to use the seven miles of line of the Garbutt Lumber Co. for a portion of the extension.

WEST SIDE BELT.—The Pittsburgh Construction Co., of Pittsburgh, has been awarded the contract for the extension of this belt line, 20 miles, from Banksville, Pa., via West Liberty, Fair Haven, Castle Shannon, Curry and Bruce, to a connection with the Monongahela Division of the Pennsylvania. (May 3, p. 308.)

WILLIAMSPORT & LOCK HAVEN TRACTION.—This company has been incorporated in Pennsylvania, with a capital stock of \$150,000, to build an electric railroad about 28 miles long, from Lock Haven to Jersey Shore and Oak Grove. J. Henry Cochran, of Williamsport, is President.

WINSTON & WADESBORO.—Application has been made for a charter for this company in North Carolina, with a capital stock of \$500,000, to build a line from Winston south about 90 miles to Wadesboro on the Atlantic Coast Line. Among the stockholders are: Col. Thomas Wilson, Cade's, S. C.; Wm. E. Huger, R. G. Rhett and F. Q. O'Neill, Charleston, S. C.

WISCONSIN CENTRAL.—The right of way is being cleared, according to report, for an extension of the Rib Lake branch in Wisconsin, from Rib Lake northeast about 20 miles toward Tomahawk. It is to be leased to the W. A. Osborn Lumber Co.

RAILROAD NEWS.

ATLANTA, KNOXVILLE & NORTHERN.—The issue of \$1,500,000 new 5 per cent. preferred stock, noted last week (p. 342), is to be exchanged for a like amount of outstanding second mortgage income bonds.

BALTIMORE & OHIO.—Arrangements are being made, according to report, for buying the Morgantown & Kingwood, which is projected from Morgantown, W. Va., to Kingwood, 26 miles, of which 12 miles is completed; also for acquiring the Cassville & Monongahela, a projected line five miles long from Cassville, W. Va., to the mines of the New York & West Virginia Coal Co. (M. & K., April 12, p. 259; C. & M., April 19, p. 275.)

CENTRAL OF GEORGIA.—The stockholders, on May 13, ratified the purchase of the Chattanooga, Rome & Southern and the Chattanooga & Durham. It was also decided to issue 4 per cent. bonds at \$6,000 per mile on the Oconee Branch, making \$462,000 in all. (C. R. & S., March 22, p. 210; C. & D., July 13, 1900, p. 480.)

CHICAGO, BURLINGTON & QUINCY.—J. P. Morgan & Co. announce that two-thirds of the stock has been deposited at the Colonial Trust Co., Boston, and the Metropolitan Trust Co., New York, thus insuring the taking

over of the property by the Great Northern and the Northern Pacific. It is stated that more than 90 per cent. of the stock has been deposited. (May 3, p. 308.)

CHICAGO ELEVATED ROADS.—According to Chicago press despatches arrangements are being made by John J. Mitchell, President of the Illinois Trust & Savings Co., for consolidating all the elevated roads in Chicago except the South Side Elevated. A new company is to be formed to take over the five companies concerned. The combined capital stock of the consolidated companies is \$42,500,000 and their bonded debt \$29,275,000. The roads to be included are the Union Loop, the Lake Street L., the Northwestern L., the Metropolitan L., and the Union Consolidated.

DENVER & RIO GRANDE.—The stockholders, at Denver, Colo., on May 15, ratified the purchase of the Rio Grande Western and the increase of the capital stock to \$82,400,000, of which \$44,400,000 is to be preferred, and \$38,000,000 common. The holders of the preferred stock also approved the issue of \$6,900,000 consolidated mortgage bonds for future requirements. (April 5, p. 246; May 3, p. 308.)

GREAT NORTHERN OF CANADA.—This company's \$4,000,000 first mortgage 5 per cent. bonds have been underwritten at 87½, at which price the loan was over-subscribed. (Oct. 5, 1900, p. 662.)

GULF & INTERSTATE.—This property, for some time past in the hands of a receiver, has been bought, according to report, by the St. Louis Southwestern. The road extends from Beaumont, Texas, to Port Bolivar, 70.35 miles, and about 27 miles of this was destroyed during the storm in Texas last year. (Oct. 12, p. 680.)

HAWKINSVILLE & FLORIDA SOUTHERN.—A meeting of the stockholders is called at Atlanta, Ga., June 17, at 10 a. m., to accept the railroad extension built by the Enterprise Lumber Co., and to issue \$50,000 of bonds or provide some other means for paying for the road. (Construction Supplement, March 8, 1901.)

HIDALGO & NORTHEASTERN.—The Herald, of Mexico City, Mex., announces that an option has been made on this property to William Astor Chanler and C. D. Wetmore, of New York City.

KANSAS CITY & ATLANTIC.—The Union Depot, Bridge & Terminal of Kansas City, whose incorporation was noted last week in the Construction column (p. 342), is to be the successor company of the Kansas City & Atlantic. The sale of the property was confirmed May 14.

KANSAS CITY, FORT SCOTT & MEMPHIS.—Over 99 per cent. of the stock of this company and of the Kansas City, Memphis & Birmingham has been deposited with the Old Colony Trust Co., Boston, under the offer of the Pierce Syndicate. Additional deposits will be received until further notice. The Old Colony Trust Co. is distributing about \$15,500,000 cash to the depositing stockholders. (March 22, p. 210; April 5, p. 246.)

KNOX & LINCOLN.—This line, which extends from Bath, Me., to Rockland, 48.99 miles, has been merged with the Maine Central under the act of the Maine Legislature of Feb. 20, 1901. The property has been leased by the Maine Central since Aug. 1, 1891. By the bill the Maine Central is authorized to increase its capital stock by \$2,000,000, none of which has been issued.

MOBILE & OHIO.—J. P. Morgan & Co. announce that after May 20, the collateral trust bonds and the stock trust certificates of the Southern are to be issued in exchange for J. P. Morgan & Co.'s trust receipts issued for the stock and bondholders of the M. & O. (March 1, p. 152.)

NEW YORK CENTRAL & HUDSON RIVER.—The stockholders at Albany, N. Y., May 21 ratified the contract to lease the Beech Creek Extension. This includes the Susquehanna & Clearfield between Karthaus, Pa., and Keating; a leased portion of the Pennsylvania lines from Keating to Lock Haven, about 40 miles, and a new line building from Karthaus to Clearfield, about 29 miles, the three lines giving direct connection from Clearfield through Karthaus, Keating and Lock Haven to Williamsport. (May 10, p. 324; Construction Supplement, March 8, 1901.)

NORTHERN PACIFIC.—The Manitoba Legislature has passed the bill confirming the sale of the Manitoba lines of the N. P. to the Canadian Northern under the terms recently noted. (April 26, p. 292.)

ST. LOUIS & SAN FRANCISCO.—The stockholders, on May 16, authorized the proposed new issue of stock and the refunding mortgage for \$85,000,000. (April 12, p. 260.)

SEATTLE & SAN FRANCISCO RAILWAY & NAVIGATION.—The contest among the shareholders for the control of the property began at Seattle, Wash., on May 9, in the Superior Court under Judge Griffin. The Guerin faction filed quo warranto demanding that the Leary faction show cause for occupying the offices and handling the property of the road. (Nov. 30, 1900, p. 802.)

SOUTH BOUND.—Judge Gage, at Columbia, S. C., on May 16 issued an order restraining the Seaboard Air Line from acquiring this property and ordering the authorities of that company to show why a receiver should not be appointed. (See S. A. L., May 10, p. 224.)

TENNESSEE COAL, IRON & RAILROAD.—The company is to issue general mortgage bonds due July 1, 1951, for an amount not to exceed \$15,000,000, of which \$10,653,500 is reserved to take up existing bonds of the corporation. The Union Trust Co., New York, is trustee. The bonds are also to be secured by a sinking fund provision.

UNION PACIFIC.—Application has been made to the New York Stock Exchange for listing \$100,000,000 first mortgage collateral trust convertible 4 per cent. bonds. This includes \$40,000,000 already sold to provide funds for buying the Southern Pacific stock. (April 26, p. 292.)

WESTERN MARYLAND.—The stockholders of the Baltimore & Cumberland Valley have decided to increase the capital stock by \$1,750,000 for making the proposed improvements. (April 19, p. 275.)

WILLIAMSPORT & NORTH BRANCH.—Arrangement has been made to cancel the old mortgage for \$2,000,000, and execute a new one for \$750,000. The new bonds will bear interest at 4½ per cent., and are dated July 1, 1901, maturing in 30 years. The Fidelity Insurance Trust & Safe Deposit Co., of Philadelphia, is trustee. The present issue will be \$500,000 on 45 miles of road now in operation, and also on real estate and coal lands. The remaining \$250,000 will be reserved for extensions only. The new issue has been bought by Wilson & Stephens. (Sept. 28, 1900, p. 644.)